FLIGHT and AIRCRAFT ENGINEER

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The Outlook

British Aviation on View

THE great show at Farnborough, which opened last Tuesday and closes next Sunday afternoon, affords an excellent opportunity not only for examining individual exhibits at rest or in action but for obtaining a general picture of the state of British aviation at this particular moment. Moreover, certain noticeable trends give an indication of the directions which future developments are likely to take.

Outstanding impression of this year's S.B.A.C. Display is the progress made with turbojets and turboprops, and their actual use in appropriate types of aircraft. That the application of the former should be mainly, although not exclusively, confined to military aircraft is but natural. Until the de Havilland Comet comes along, we have no civil airframe initially designed to make full use of jet propulsion, although the Vickers Viking with two Nenes is an experiment which gives a pointer.

Civil aircraft in the turboprop class have a single representative at Farnborough in the Vickers Viscount, the first machine of its kind to fly; the Armstrong Whitworth Apollo was not finished in time for the show. Both give great promise and should provide extremely useful information.

Also designed for turboprop power plants, there are coming along the two real giants: the Bristol Brabazon and the Saunders-Roe S.R45 flying boat, which represent a long-term policy and are of a much more ambitious nature. The many problems associated with such large aircraft readily explain the time taken to build them. The Brabazon I will doubtless take part in next year's display.

The piston-engined civil transport picture now looks a good deal brighter than it did at the time of last year's S.B.A.C. Display. The Avro Tudor IV has been "saved," and we have no doubt British South American Airways will make very good use of it. On the Empire routes the Handley Page Hermes IV (the first of which has now flown) can be expected to give a good account of itself when it has done its trials and proving flights. Its probationary period should be shortened by the experience already gained with the Hastings, the military counterpart of the Hermes.

When one turns to military aircraft, the fighters are apt to steal all the thunder by virtue of their spectacular performance. This applies, of course, particularly to the jet-propelled fighters, of which no fewer than seven types are current, one of which is the Saunders-Roe flying boat. The Vampires and Meteors have long been in service with the R.A.F., and many foreign air forces have chosen British jet fighters, a fact which speaks for itself.

A Disquieting Gap

THE many other classes of British military aircraft, as listed in tables last week and illustrated in this issue, are adequately represented by good straightforward types, well able to perform the functions for which they were designed. But one can hardly fail to notice that, through Government policy and not due to any inability of firms to produce what is required, but a single type represents the heavy bomber in the Royal Air Force. Good as is the Avro Lincoln, it was designed for the German war, and it does not appear good policy to rely on any one single type. Two years ago it was announced that in future the R.A.F. would be equipped exclusively with turboprop or turbojet operational aircraft. At the time we expressed doubts as to the wisdom of such a step. It would appear that we were justified in this, as no announcement has yet been made of bombers fitted with turbojet power plants coming along shortly. Moreover, there is apparently no intention to adopt the new large turboprops for military aircraft, either bombers or transports. Thus there may well be an uncomfortable gap between the

well-tried Lincoln and the "New Look" bombers which must be planned. An official statement on this subject would be welcomed. The nation is entitled to an assurance that the gap will not be permitted to persist.

It has so happened that, by a turn of circumstances, a number of American heavy bombers are at present stationed in this country, where they have been able to help by joining the Air Exercises. But that was a fortuitous addition which could hardly have been visualized when the new equipment policy for the Royal Air Force was formulated. The fact that our American friends are likely to remain in this country until the present political situation has been cleared up is reassuring, even if it reflects no particular credit on our earlier policy makers.

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Motive Power

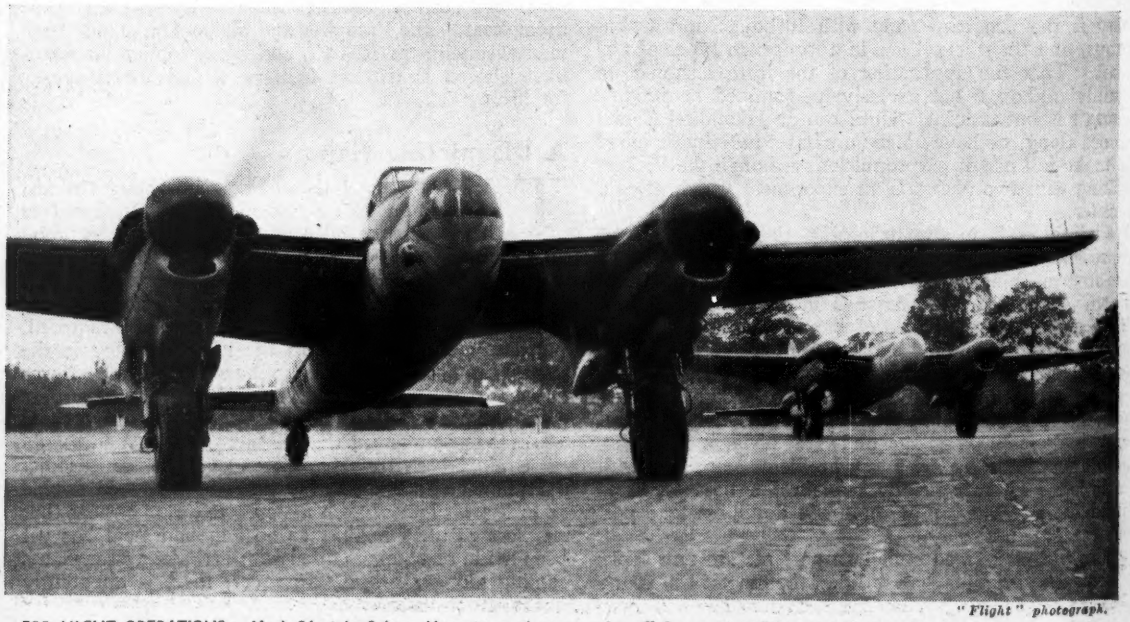
CONSIDERABLE satisfaction must be felt by anyone who studies the British power-plant industry, the products of which were described, illustrated and tabulated in last week's issue. British manufacturers can show a remarkable range of prime movers, reciprocating as well as turbines, most of which have already proved their worth and reliability either in actual use over a number of years or by passing strenuous endurance tests on the bench.

The only field which is not yet adequately covered by British manufacturers occurs at the low-power end of the scale, where there are no engines in actual quantity production of less than 100 horse power. That situation, however, will probably be remedied sooner or later, and the Ultra Light Aircraft Association is doing good pioneer work in pressing manufacturers for low-power engines.

At the other end of the scale, in the 3,000 h.p. or over class, we have but two types, of which the Napier Sabre has seen war service and a good deal of development, while the Rolls-Royce Eagle, although already rated at 3,500 h.p., is undoubtedly capable of further development, judging from the history of the Merlin. The fact that the Eagle is fitted in one aircraft only, the Westland Wyvern, appears to indicate that present plans do not include it in the future programme.

In the gas turbine field Great Britain is holding her own. Present types include seven turboprops and nine turbojets, and one very encouraging aspect of the picture is that no fewer than six individual firms are developing these sixteen gas-turbine power plants. Spreading the load in this way makes for more rapid progress and guards against unforeseen delays.

Closely associated with future engine development is the fuel question. The decision to concentrate on turbines is likely to bring problems of supply. It has been stated on more than one occasion by fuel experts that although there will be enough kerosene for civil requirements, the demands of the British and American air forces will exceed any foreseeable production. With that possibility in mind, steps are already being taken to use petrol fuels for the turbines, and it is significant that one British firm, Dowty Equipment, Ltd., has recently completed a 500-hours' non-stop test on a fuel pump running on straight aviation petrol without any lubricant.



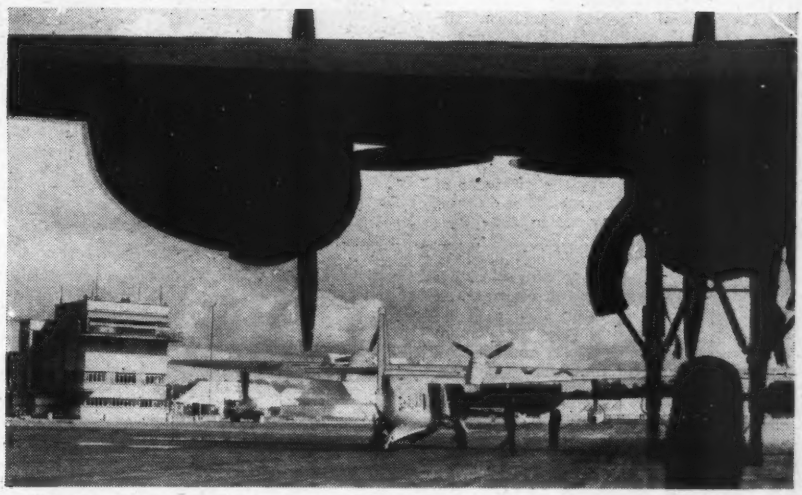
"Flight" photograph.

FOR NIGHT OPERATIONS: Mark 26 night-fighter Mosquitoes about to take off for routine flying test during the Air Exercises. Radar scanners can be seen behind the clear Perspex nose. Standing patrols and scramble crews were maintained by the defenders.

Farnborough '48

Inauguration of the Greatest S.B.A.C. Display : The Presidential Speech

Illustrated with "Flight" photographs



From the moment of arrival the Short Sealand light amphibian attracted admirers. It is glimpsed from the shadow of the grim, camouflaged, Avro Lincoln, once again the only heavy bomber presented.

THAT the Ministry of Supply airfield at Farnborough, Hants, should have been made available for the 1948 Display and Exhibition of the Society of British Aircraft Constructors is a matter for congratulation of the Society and for thanks to the Ministry. Inevitably, the work of the Royal Aircraft Establishment (itself identified with the word "Farnborough") will for several days be more or less disrupted; but adoption of the new *venue* —which imposes fewer traffic restrictions than Radlett and, more important, allows the long-proposed admittance of the public—should swell the Exchequer by promoting export sales, benefit British prestige and stimulate public morale.

In the normal way, Farnborough is a closed establishment, being continuously engaged in research and experimental work of a secret nature. Many of our friends from overseas will, nevertheless, be able to glimpse something of its facilities and, on the Ministry of Supply stand, some of its achievements. It is mainly for the edification of our visitors that a historical sketch of the Royal Aircraft Establishment will preface an advance report of activities last Monday and Tuesday.

To this day, one may see at Farnborough two large sheds which, when the Establishment was founded some 43 years ago, housed balloons and man-lifting kites. The years 1914-18 saw the production, by the short-lived Royal Aircraft Factory, of the BE, FE, RE and SE series of military aircraft, and between the first and second world wars research and development progressed along diverse lines. During the expansion of the Royal Air Force in 1943-6 the R.A.E. was the consultant authority both for the Services and the Industry and made important contributions to the performance and operational efficiency of many famous types of British aircraft employed in the late war.

To-day, the R.A.E. is advising all three Services and the entire aircraft industry on matters of aircraft and power plant design, and by virtue of its own unique knowledge of the practical side of flying, is able to devise instruments, radio and radar, armament gear and other vitally necessary equipment. It has rightly been said of the R.A.E. that it provides the Empire with a foundation for success in both civil and military flying, and it is thus fitting that its historic home should become the scene of Britain's greatest and most significant air display.

The Assembly Begins

A stiff cross-wind added to the interest of watching arrivals on Monday, September 6. Rumours were rife, as always, and many were the hopes and fears expressed. Word passed round of the successful first flights of the Hermes IV and Tudor VIII (the latter had already been delivered to Boscombe Down), but there was general regret that the Gloster E.1/44 and Attacker would not perform. The warm sun and broken, friendly, cloud promised well for the great day to follow. And, in fact, Tuesday dawned fair, if cloudy, over as impressive a £4 million aircraft park as has ever been mustered. Seventy machines, resplendent and in orderly array, awaited inspection by the chosen delegates of as many countries, and the hundreds of stands were prepared for their expert examination. A fitting start to the aerial activities was the arrival fly-past of the Tudor VIII, and, in contrast,

Flanked by the fully furnished Fairey Gyrodyne and the Bristol 171, Mark 2, helicopters, the Cierva Air Horse looms massively.

Farnborough '48 . . . . . .

an Eon-launched Olympia Eon sailplane swooped silently overhead.

At the official opening luncheon the guests were welcomed by Sir Roy Dobson, C.B.E., F.R.Ae.S., who is president of the Society of British Aircraft Constructors for 1948-9. He pointed out that this, the ninth S.B.A.C. Display, was notable in two ways: It was the first time the general public was being admitted, and the taxpayer had a very direct interest in the British aircraft industry as the producer of aviation equipment for the R.A.F. and R.N., and as an exporter to the tune (last year) or some £24 million. Secondly, the exhibits illustrated the continued progress being made in gas-turbine power plants which, this year, were fitted in civil as well as in military aircraft.

The lead established during the war in gas turbines had not been lost, and Sir Roy reminded his audience that what they saw at Farnborough was only a part. Behind the scenes the pace of development was accelerating, and there was good reason for confidence in our ability to remain in front.

Compared with the peak which the industry reached in 1944, the present-day size was fractional, but the brains, which were the essence of the matter, were still there. Sir Roy recalled that such results as an export last year worth £24 million, with a higher export rate in the first seven months of this year, had been achieved by a private industry. They were grateful for the co-operation of Government departments, but that help would be of little avail if the design and production skill and initiative of the private manufacturer were eliminated. "Let us beware," Sir Roy said, "of interference with a set-up the success of which is so patently evident in the exhibition arranged here to-day."

Sir Roy said that Mr. Strauss, the Minister of Supply, had taken great trouble to understand the problems of the aircraft industry, and he was closely associated with the industry in the exhibition. Many of the aircraft on view, while designed and built by members of the Society, had been constructed to M.o.S. contracts and with collaboration of the Ministry's technical branches. He especially thanked Sir Alec Coryton, Controller of Supplies (Air), without whose wholehearted co-operation many of the exhibits could not have been on view.

In welcoming the guests from overseas, representing no fewer than 69 countries, Sir Roy said he doubted whether such a dazzling array of leaders in the aviation world had ever previously met under one roof.

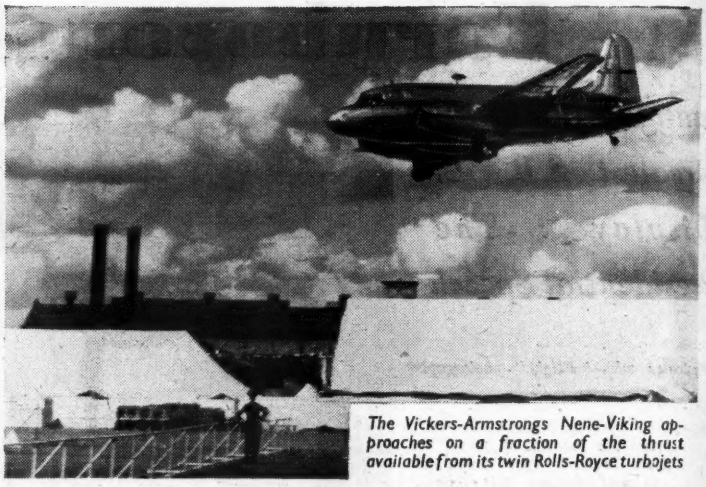
Replying on behalf of the guests for the "generous hospitality and friendly reception," Mr. G. R. Strauss, M.P., Minister of Supply, said that he was proud indeed to be associated again (he was Parliamentary Private Secretary to Sir Stafford Cripps when Minister of Aircraft Production) in a much closer way with an industry that had such a magnificent record in times both of war and peace. It was a pleasure to be able to make Farnborough available to the S.B.A.C., and he regarded this as symbolic of the close and cordial relationship between his Ministry and the industry. He was particularly glad also that the public should have the opportunity of seeing for themselves the achievements of British aviation.

The Minister was delighted that for the first seven months of 1948 the British aircraft industries' export contribution was £16 million, about one-third being in hard currency. To the industry he said "Thank you and please carry on."

Among our outstanding achievements during the year had been the 100-km closed-circuit record, broken three times in rapid succession by British firms—in two instances using operational aircraft. Possibly of even greater importance was our holding of the world's altitude record. Mr. Strauss added: "As the efficiency of fighters continues to depend upon their manœuvrability, and as the altitude at which all types of military aircraft are required to operate continues to increase, the significance of these two British records will be apparent to you all."

Referring to the functions of his Ministry, Mr. Strauss stated that while actual designs emanated from the most able and often brilliant teams of the individual manufacturers, it was the M. of S. that planned and set in motion virtually all development work, and also invested millions of pounds each year in the advancement of aeronautics. One of the most important services rendered to the advancement of aviation was to see that all new knowledge, whether it originated in individual firms or in the Ministry's establishments, was pooled throughout the whole industry. As an example of his Ministry's partnership with the aircraft industry, Mr. Strauss mentioned the two flying-wing research aircraft designed for his establishments by one of the aircraft firms.

Turning to recent outstanding achievements by gas turbines, the Minister mentioned two special tests initiated by Sir Alec Coryton, which simulated 500 hours' conditions of flight by airscrew turbines, and added that the maintenance required was only 35 man-hours for the Theseus and 15 man-hours for the Mamba. These truly amazing figures justified us in saying that this type of engine was immensely more economical in maintenance than anything we had previously experienced. In conclusion, he said that he was hopeful that we had reached a stage where in civil aviation neither economical nor technical considerations would again force us to depart from our established policy to "Fly British."



The Vickers-Armstrongs Nene-Viking approaches on a fraction of the thrust available from its twin Rolls-Royce turbojets

Arrival of the second A.W.52 flying wing research aircraft. This example is powered by R.-R. Derwents (7,000lb total thrust) whereas the first, likewise present, has Nenes.

AIR EXERCISES

Test of Britain's Air Defences and Prototype Equipment

THE Air Exercises which took place during last week-end from Friday to Monday were designed to test the air defences of Britain when operating against mass attacks or single raiders by day or by night.

So effectually was the Battle of Britain won that, except against a brief recrudescence of night bombing later in the war, no opportunity has since occurred to test the many improvements which have been made in our system of detection, report and interception.

In Sir William Elliot's own words, "We shall be exploring such problems as, how many aircraft a controller can control at once, how we can eliminate the time lag in our reporting, control and interception procedure, and what are the limitations in intercepting formations of bombers in daylight and various concentrations at night."

"Flight" photograph.
Air Marshal A. B. Ellwood, commander of "Southland" forces.

Also, it must be remembered, most of the present-day aircrews have no war experience, and exercises such as this are the only means of giving them realistic battle practice.

Briefly, Bomber Command became Southland—a Continental power—and Fighter Command, aided by the Army anti-aircraft units and large forces of the Royal Observer Corps, became Northland, which included South-east England, East Anglia and the Midlands. Reserve, Coastal, Training Commands and B.A.F.O., all took part, as did three Groups of Superfortresses of the U.S.A.F. stationed in Britain. The complete exercise was known as "Operation Dagger."

Air Marshal A. B. Ellwood, A.O.C.-in-C. Bomber Command, set the problems, and the answers had to be found by Air Marshal Sir William Elliot, A.O.C.-in-C. Fighter Command, and Lt. Gen. Sir Iver Thomas, G.O.C-in-C. Anti-Aircraft Command.

Since no jet bombers (day or night) or jet night fighters were available, the pattern followed last-war operations almost exactly. The Lincolns were, perhaps, a trifle faster than the wartime Lancasters, and the Superforts stepped things up by another 50 m.p.h. or so. The only really fast attacking aircraft were a few de Havilland Hornets specially brought in for the occasion. The effective employment of jet fighters, handicapped by their very limited endurance, was an important feature.

"Flight" photograph.
Air Marshal Sir William Elliot who commanded the defending forces of "Northland."

Operating heights showed an increase. The Lincolns did eight-hour trips at up to 25,000ft, and the Superforts were due to fly at 35,000ft. It was not disclosed whether the effective ceiling of the anti-aircraft guns had been increased since the war.

To make the operations more realistic for the Lincoln crews, each aircraft carried 14 × 500-lb live bombs which were dropped on Heligoland, and it was the intention to carry a number of 4,000-pounders if weather conditions were good.

Night attacks by fighters were indicated by the flashing of signal lights, and bombers did the same if their air-gunners opened fire first.

Because of the danger occasioned from dud photoflash bombs, it was impossible to use the usual photographic check on night bomb-aiming. Radiolocation plus the photography of H2S screens were the only checks.

The chief umpire was Air Marshal Sir Hugh S. P. Walmsley, Deputy Chief of Air Staff, and he, also, operated from Fighter Command H.Q. at Bentley Priory, Stanmore, Middlesex, where the famous wartime operations room once more became a hive of activity.

Because of demands on our space by the S.B.A.C. Display and Exhibition at Farnborough, we are unable to give a full narrative of the Air Exercises in this issue. The next issue of *Flight*, however, will contain a detailed account from observers at both Bomber and Fighter H.Q.s, and with the squadrons.

Waiting to scramble. Ground crews standing by at a "Northland's" Meteor station.

HERE AND THERE

Smiths' Training Courses

TO provide the specialized knowledge essential to those whose duty it is to install, overhaul and test equipment manufactured by Smiths Aircraft Instruments, Limited, this firm has established a fully equipped training unit at its Cheltenham factory. Courses of instruction range from a refresher course of three days to a three-weeks' course for base maintenance engineers covering all types of instruments. A separate syllabus on the S.E.P.1 automatic pilot is being planned, and will commence later in the year. Full details of these instruction services may be obtained from Smiths Aircraft Instruments, Ltd., Cricklewood, London, N.W.2, who have produced a brochure describing the courses available; living accommodation can be arranged for trainees.

Fire at Titanine's

DURING the mid-morning of September 5th fire broke out in the Colindale factory of Titanine, Ltd. The fire appeared to gain a rapid hold, flames leaping 100 feet into the air. Due to the prompt action of the staff, who were either on the spot or quickly available, the fire was confined to the lacquer factory and sampling shop. Contrary to the inevitable rumours which were spread around, this was the only damage. Titanine's Scottish factory has ample lacquer production available, and will step up to meet total requirements so that orders will not be held up. It must be stressed that the Titanine aircraft dopes and finishes factory was not damaged in any way whatsoever, neither was the administrative block.

DOVES FOR BURMA: A photograph of one of the six de Havilland Doves which are being supplied to Union of Burma Airways. The first three arrived at Rangoon on August 28th and de Havilland's have received a cable describing "a faultless performance throughout entire trip."

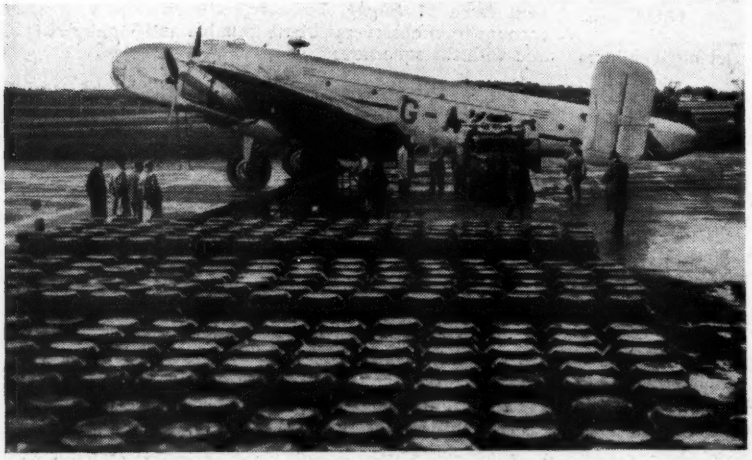
New A.S. Test Pilot

S/L. J. B. STARKY, D.S.O., D.F.C., has been appointed assistant test pilot at Armstrong Siddeley Motors, Limited. He will assist S/L. Price-Owen, the company's chief test pilot. S/L. Starky, who is a New Zealander, served with the R.N.Z.A.F. in the Middle East and with Bomber Command in Europe. Since the war he has been engaged in testing at the A. and A.E.E., Boscombe Down.

S/L. J. B. Starky, D.S.O., D.F.C.

Golfing Society's Autumn Meeting

ON Tuesday, September 21st, the autumn meeting of the Aero Golfing Society is to be held. Entries for the competitions close on September 18th. Members may, if they wish, arrange their own partners for the day; otherwise this can be done through the secretary. Special prizes are awarded at the end of each year based on the results of each meeting, and, therefore, in order to qualify for these, members' cards should be handed in irrespective of the score. A cocktail party has been arranged at the club for 6 p.m. by Mr. W. J. Shilcock, to which all members are invited, whether or not they have been participating in the day's play.



AIR FLOAT: Loading 10-gallon milk churns at Belfast for the flight to England. The Ministry of Food have chartered thirteen aircraft for two months to bring milk from Northern Ireland. It is planned to make over 60 flights a day, and the target figure is to transport 350,000 gallons of milk a week to Speke and Squiresgate.

Navy in Fly-past

SIX Firebrands from Anthorn, Cumberland, and six Seafires from Lee-on-Solent, will represent the Royal Navy in the Battle of Britain fly-past on Wednesday, September 15th. This is to commemorate the part played in the battle by aircraft of the R.N.; 40 pilots under training at the Fighter School, H.M.S. *Raven*, volunteered to fly with the R.A.F. at that time, and a similar number of torpedo-bomber reconnaissance pilots served with Bomber Command. In addition, Coastal Command were lent seven Naval squadrons at the time of the invasion of the Low Countries, and some remained with Coastal Command during the Battle of Britain.

Atom Afloat

THE U.S. Navy has issued a specification for a 44½-ton carrier-borne bomber, capable of carrying an atom bomb, with a striking radius of 1,700 miles at a cruising speed of 574 m.p.h. A maximum speed of over 650 m.p.h. is also demanded. It is intended to power the bomber with a new type of jet unit giving "more thrust for half the fuel consumption of present types of tubine"; the Navy claims that this unit is now well advanced in development.

Aircraft of this type will operate from America's 65,000-ton aircraft carrier now being built and due for commission in 1952.

B.O.A.C. Offices in Montreal

THE new offices of the British Overseas Airways Corporation, which were opened this summer at the Laurentian Hotel, Montreal, are known as

HERE AND THERE

"Speedbird Corner." Located centrally, B.O.A.C. officials claim that the offices are the most modern and efficient in North America. The Corporation's house colours of blue, grey and gold have been used for decoration.

American Strength in Europe

ACCORDING to figures released recently the U.S. Air Force has increased the number of military aircraft in Europe from 175 to 466 during the past six months; the personnel has been increased from 5,000 to 18,000. Of these aircraft 90 are Fortresses based in England and 75 modern jet fighters in Germany. Engaged on the supply run to Berlin are 125 Skymaster transports. A transport service between Europe and New York will provide a "ferry" connection for personnel going home on leave which will be available for Servicemen's wives.

Not So Pacific

THE U.S. Navy has for two years been making secret tests with guided missiles at Point Magu on the Californian coast, about 50 miles north of Los Angeles. So far the experiments have been made with temporary facilities, but the Navy has now been granted £7,500,000 to spend on the base.

Point Magu's nearness to aircraft factories in South California enhances its position as a permanent test centre, and the behaviour of missiles discharged may be observed from the nearby Santa Barbara Channel Islands. There is already a staff of 1,150 civilians, and 850 naval personnel, and this is to be increased.

New M.C.A. Booklets

AN interesting series of booklets on Britain's airports is being produced by the Ministry of Civil Aviation; the first of these, entitled *London Airport*, became available on August 30th at the price of 1s, from bookstalls. In this publication the construction of the airport, one of the most important engineering undertakings yet embarked upon in this country, is described, and the plans for making this airport one of the largest and most up-to-date in the world are outlined. All the activities of the personnel are described, and the radar control, briefing and illumination services for night landing and for coming in in bad visibility make an interesting story. The booklet contains many excellent photographs, both of aircraft and features of importance on the ground.

Cierva Memorial Competition

THE Council of the Helicopter Association of Great Britain announce that the prize for the Cierva Memorial Essay Competition, 1947-48, has been awarded to D. R. Garraway, B.Sc., for his essay entitled "The Structural Airworthiness of Helicopters with particular reference to Fatigue Failure." The winning essay is reproduced in the Association's Journal. Owing to the somewhat poor response to the 1946-47 competition no award was made that year and Mr. Garraway is therefore the first winner of this prize. The title for the 1948-49 essay competition has been broadened to allow the widest possible field of entry, and the prize for 1949 will be awarded for the best paper of a technical nature on any subject connected with rotating wing aircraft. Full details of the rules for the competition may be obtained from the Association's assistant secretary at Londonderry House, Park Lane, W.1.

A CREDIT TO BRITAIN: Seen on their return from America with the Wakefield Trophy are aeromodellers M. King (London), D. Piggott (Croydon), R. Chesterton (Northampton), R. Copland (London) and C. Doughty (Birmingham). The sixth member of the British team—Mr. L. Stott of Halifax—remained in America on business. Competing teams finished in the following order: Gt. Britain, New Zealand, U.S.A., Canada, Belgium and Australia.

SOUVENIR: Participants in the Ostend International Air Rally were presented with attractive plaques as mementoes of their week-end as guests of the Ghent Aviation Club.

News in Brief

Mr. H. Constant, M.A., has been appointed Director of the M.o.S. National Gas Turbine Establishment, in succession to Dr. Roxbee Cox, who is to take up an appointment with the Ministry of Fuel and Power. Mr. Constant was previously a deputy director of the Establishment.

* * *

The Seventh International Congress of Applied Mechanics is being held between September 5th and 11th. Particulars may be obtained from the Organizing Secretary, Imperial College, South Kensington, London, S.W.7.

* * *

Mr. J. V. Connolly, B.E., A.F.R.Ae.S., has been appointed by the Governors to be Professor of Aircraft Economics and Production at the College of Aeronautics. Professor Connolly, who was born in Australia, has held appointments with the Air Ministry, A.R.B., M.A.P., and the Ministry of Supply.

* * *

A commissioned pilot in the U.S. Air Force is paid over $4,000 (£1,000) a year, according to recruiting advertisements in American aeronautical journals. Those accepted as Aviation Cadets receive this on successful completion of a 52-week training course.

* * *

Many enquiries were received by the Air Ministry last week when a R.A.F. Anson was seen circling low over London. The pilot had received special permission to fly below 1,500 feet to complete a 50-inch to the mile mosaic map of Greater London.

* * *

The Leytonstone Jig and Tool Co., Ltd., announce that they have opened an office at 31, Wilcocks Street, Toronto, 5, Canada. The company's resident director is A. V-M. D. F. Stevenson, C.B., C.B.E., D.S.O., M.C. All "Leytool" productions may now be obtained at this address.

* * *

Mr. J. Lester Pendleton, formerly sales manager of Auster Aircraft, Ltd., has taken up a new appointment as sales manager of Field Aircraft Services, Ltd., at Croydon. He served with the R.A.F. from early in the war until 1944, when he was released to control Auster servicing and spares for military aircraft.

* * *

B.E.A. are sending an association football team to Denmark as guests of Danish Airlines from September 10th to 12th. The hosts are, with Swedish Airlines and a Malmo team, arranging a week-end tournament. Earlier in the year the B.E.A. team reached the finals of the A.F.I.A. tournament in Holland and were defeated only by Swedish Airlines.

CIVIL AVIATION NEWS

ACTIVITY AT RADLETT: After its 75-minute initial flight on Sunday, September 5th, the Handley Page Hermes IV put in some hard work accumulating the requisite number of flying hours for the S.B.A.C. show at Farnborough. S/L H. G. Hazelden flew the aircraft around the West Country and East Anglia for 5 hours on the same day, and was well satisfied with performance and handling.

Australian Convair Here : S.A.S. Forecast Future Traffic

ATLANTIC EXCURSION FARES

REPRESENTATIVES of all airlines concerned with the transatlantic route recently held an informal meeting in London to discuss the proposed introduction of excursion tickets at reduced rates on the North Atlantic route. The majority of companies supported the idea and the meeting agreed detailed proposals for the approval of the companies in question and ratification by the government authorities. Although all companies have endeavoured to agree a standard method of offering the concessions to the public, it was found that the new facilities presented practical problems on which there had been no previous experience, and it was emphasized that uniform practice should be agreed upon by all concerned to avoid confusion and inconvenience. Tickets will be valid for 30 days over a period starting October 1st this year and lasting throughout the winter until April 1st, 1949. They will be effective in both directions between North America and Europe, and will result in excursion fares of approximately one-and-a-third times the normal single fare.

B.O.A.C. CONGRATULATIONS

AFTER the successful first flight of the Hermes IV Mr. Whitney Straight sent the following telegram to Sir Frederick Handley Page: "Very many congratulations from all of us at B.O.A.C. on the splendid first flight of the Hermes. We look forward with keenest anticipation and confidence to using the Hermes on our trunk routes, and we feel sure it is going to be a winner." Twenty-five 40-seater Hermes IVs have been ordered for the Corporation and delivery is expected to start early next year.

AERODROME OWNERS CONFERENCE

MEMBERS of the Aerodrome Owners' Association attended a summer conference at Northampton, starting on August 31st. In a speech to members Mr. G. S. Lindgren, the Parliamentary Secretary to the Ministry of Civil Aviation, suggested that although costs of the organization of air transport should be met from the service that was being rendered, losses and subsidies must be expected during development. There was, he said, no form of transport which had not in some way or other been subsidized. All forms of transport required to carry goods traffic to make them pay, and if air transport was to pay it would need a 24-hours-a-day utilization of facilities. It never would be practicable, he said, for each municipality to have an airfield or landing ground, except perhaps for a helicopter service. Mr. R. Ashley Hall suggested that the helicopter was at the same stage as the aircraft in which Bleriot had flown the Channel, and that before very long, instead of a suburban bus service, there would be a regular helicopter service, and town planners should make allowances for providing the necessary facilities.

After visiting Sywell airfield, including No. 6 Reserve Flying School and the Brooklands Aviation repair factory, a paper was read by Mr. J. H. Riddoch on "The Design and Layout of a Medium-sized Aerodrome." The following day Mr. C. Harman Hunt, F.R.I.C.S., F.A.I., read a paper at Londonderry House, London, on "The Valuation of Aerodromes for Rating Purposes."

CONVAIR 240 AT LONDON

THE first Convair 240 to reach Europe arrived at London Airport on Saturday, August 28th, and left on Wednesday, September 1st. It was on a delivery flight from San Diego to Australia, and was flown by the chief pilot of Trans Australia Airlines, Captain John Chapman. There are three versions of the Convair 240, and T.A.A. have ordered five of the 40-seater version employing a crew of two and a stewardess. They will start operations during October or November on routes along the east coast over stages of about 450 miles. For this the operating height will be about 13,000 feet, and cabin pressure will be maintained for an equivalent height of 5,000 feet. The new aircraft will replace Douglas DC-3s and DC-4s, and are expected to work at an operating cost at least 15 per cent below that for the latter and 20 per cent below that of the DC-3. T.A.A. selected the Convair 240 as the most suitable aircraft for the type of operations, and for reasons of early delivery. It is understood also that by ordering when they did, the Australian company have been able to save about $1,000,000 on the purchase price, since the selling price of this type of aircraft has risen by about $200,000 (approximately £50,000) in the meantime. The remaining four aircraft will be delivered in the course of the next few months.

I.A.T.A. GENERAL MEETING

FROM Tuesday, September 14th, until Saturday, September 18th, the fourth annual general meeting of the International Air Transport Association will be held in Brussels. Sir Frank Whittle will deliver the annual I.A.T.A. paper on September 15th, and his subject will be the application of the gas turbine to civil air transport aircraft. Professor George P. Baker, who was originally scheduled to address the assembly of international airline executives, has been forced by illness to cancel his plans. Mr. Gilbert Perier, president of Sabena, will take office as president of I.A.T.A. at the opening session of the meeting, in succession to Dr. J. Bento Ribeiro Dantas, president of the Brazilian airline Servicos Aereos Cruzeiro do Sul. The financial, legal, technical and traffic committees will report on the past year's activities, and ask delegates to

approve policies for the next year's work. Other topics to be discussed include charter operations by scheduled airlines, standardization of airline practices, international conventions affecting air transport, insurance matters and the operation of the I.A.T.A. Clearing House in London.

SWEDISH FORECAST

A FORECAST based on traffic potential, population figures and living standards has been prepared by one of the Scandinavian Airline System's planning experts. These figures are said to offer a reliable estimate of future traffic under "normal conditions," and according to them A.B.A., the Swedish partner in S.A.S., which flew 62 million passenger miles in 1947, will cover 210 million passenger miles in 1955 and 615 million passenger miles in 1965. To fly these passenger miles, the company will need, in 1955, ten four-engined 50-seater aircraft and 20 twin-engined 25-seater aircraft, and in 1965 15 four-engined and 60 twin-engined aircraft of similar seating capacity. The Swedish Atlantic airport now under construction at Halmsjon will have to handle about 500 passengers per hour. It is interesting to note that the forecast emphasizes the importance of increased frequencies, rather than increased carrier capacity.

SECOND AMBASSADOR TRIALS

THE second Ambassador prototype flew for the first time on Thursday evening, August 26th, 1948, from Christchurch. This aircraft will be flying at the higher all-up weight of production aircraft, and may be regarded as representative of those which will be used by B.E.A. It is complete with pressurization and thermal de-icing equipment, but whereas the second prototype has Bristol Centaurus 630 series power plants, which were originally specified for the production aircraft, the latter will have the 660 series units with two-speed blowers and a higher take-off power. During static pressurization tests strain-gauge recordings were taken at various pressure differentials, and the leak rates checked while the aircraft was subjected to torsional stresses. Operational trials of the equipment will be started when normal flight tests have been completed.

BREVITIES

PAN AMERICAN AIRWAYS have introduced a daily reduced-fare tourist service between San Juan and New York City. Douglas DC-4 aircraft will accommodate 63 passengers instead of the usual 52. Fares on the tourist class will be 4.6 cents per mile.

* * *

The Guild of Air Pilots and Air Navigators is now responsible for awarding the Cumberbatch Trophy in addition to the Johnston Memorial Trophy announced in *Flight*, April 29th. The former is in respect of any act tending to increase reliability within British civil aviation and will probably be based upon the number of hours flying without accident of any kind.

* * *

B.O.A.C. have changed over to Lodge sparking plugs and Dunlop tyres for their six Constellations. It is estimated that the use of English designed and manufactured plugs will save $18,500 a year and the dollar saving on tyres will be $18,000 a year on the basis that the aircraft use about 8 tyres a month at a cost of $185 each.

* * *

Efforts are being made to establish an air freight exchange at Antwerp. Since the port is one of the most important in Europe it should secure an important share of air freight business. The new exchange will co-operate very closely with the Baltic exchange of London.

Northern Rhodesia Aviation Services Limited, a subsidiary company of British Aviation Services Limited, has been authorized to operate maintenance facilities at Lusaka, N'dola, and at the airfield under construction at Livingstone. The company will provide maintenance, traffic and passenger services for scheduled carriers and casual visitors.

* * *

United Airlines plan to employ pilot-engineers as third crew members in Douglas DC-6 aircraft. The scheme is in accordance with a C.A.B. ruling which requires large aircraft to carry engineers, and in addition to pilot qualification a flight engineer's certificate and an aircraft radio operator's licence will be required.

* * *

A Tudor II belonging to Air Flight Limited, of which A. V-M. D. Bennett is managing director, has joined other charter companies on the Berlin air lift. After leaving this country with nearly 10 tons of dehydrated potatoes it was to join the shuttle service between Berlin and Wunsdorf. A.V-M Bennett's aircraft is the second prototype Tudor II with all recording equipment removed.

* * *

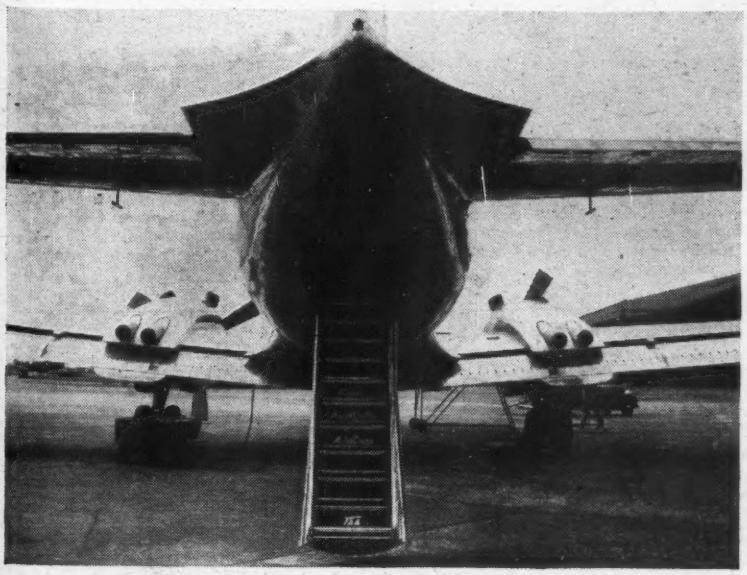
A telegram was sent on August 28th to Lord Pakenham by the Society of Licensed Aircraft Engineers deploring the announcement that B.O.A.C. were of the opinion that Constellation maintenance was at present impracticable in this country. The Society made the observation that the B.O.A.C. Croydon depot was in possession of the only Constellation electrical generator test rig outside the United States. It was stated that a British company of vast experience in overhaul and maintenance had offered to undertake the work, but the offer had been rejected on grounds of inadequate equipment and specialized skill.

* * *

Air France has increased services to Tunis to five flights a week. The Cairo service has also been modified to make one direct return service non-stop from Paris to Cairo in 9 hours 15 minutes and from Cairo to Paris in 7 hours 50 minutes, with one other return service a week stopping at Rome. The company's return service to Haifa will be flown twice a week.

* * *

Since the all-up weight of the Lockheed Constellation Model 749 has been increased to 105,000lb, the landing weight has been increased to 89,000lb. Other performance figures claimed for the aircraft are a cruising speed of 303 m.p.h. at 23,000ft with 67 per cent normal rated power at a gross weight of 105,000lb, maximum range of 5,210 miles at 10,000ft, and distance of 3,000ft to land and stop from a 50ft altitude at sea-level at maximum landing weight.



REAR ENTRY: The integral passenger steps of the Convair 240 give a sense of steadiness when being used not customary with the more usual transportable steps. The double exhaust thrust augmentor pipes on each engine can be seen to advantage in this photograph.

FROM ALL QUARTERS

7TH INTERNATIONAL CONGRESS OF APPLIED MECHANICS

DURING the present week, the 7th International Congress of Applied Mechanics is being held at the Imperial College of Science and Technology, South Kensington, London, S.W.7.

The technical sessions of the Congress are arranged in four Sections, as follows: Section 1, Elasticity and Plasticity; Section 2, Aerodynamics, Hydrodynamics, Meteorology; Section 3, Thermodynamics, Heat Transfer, etc.; and Section 4, Vibrations, Lubrication, Experimental Methods, etc. In addition, general lectures on subjects of interest to members of all Sections are also included.

The Committee hope to make arrangements for visits to the National Physical Laboratory, the Royal Aircraft Establishment, the National Gas Turbine Establishment and the General Electric Research Laboratories, during the forthcoming week.

FIRST FLIGHT: The D.H. Ghost-engined S.A.A.B. J29 making its first flight on September 1st at Linköping. It was flown by S/L. A. R. Moore. A top speed of 650 m.p.h. is expected.

CANADIAN REVENUES AND TRAFFIC

TOTAL revenue of Canadian scheduled airline companies in February was $1,624,570 as against $1,301,518 in February last year, and total expenses rose from $1,921,777 to $2,090,722, resulting in a loss of $466,152, compared with $620,259 in February, 1947. Revenue of non-scheduled carriers also increased from $179,557 to $269,533, but expenses rose from $135,727 to $370,890, resulting in a loss of $101,357, compared with a $55,606 loss the previous year. During the month passengers on scheduled services totalled 38,446 compared with 32,552 in February, 1947, and on international routes 5,795 passengers were carried compared with 5,651 the previous year. Non-scheduled carriers transported 9,218 revenue passengers as against 5,234, and foreign airlines accounted for 10,173 fares, compared with 11,271 in February, 1947. In all a total of 59,969 revenue passengers were carried by all services—an increase of 8,183 over last year.

"Flight" photograph.

OSTEND VARIETY: Among the first arrivals at the Ghent Aviation Club Rally, described last week, were the Danish KZ-VII, British Proctor, American Ercoupe, Dutch Promotor, British Messenger and Gemini, and American Fairchild. The photograph was taken from another Proctor V lent to "Flight" for the occasion by International Airways.

ALMOST A RECORD

FAILURE of the official timing camera prevented Major Richard Johnson of the U.S. Air Force from setting up a new world speed record at Cleveland last Sunday. Major Johnson, flying a North American F-86, made six runs over the course at an average speed of approximately 669 m.p.h. No claim to a new record will be made as the camera failed to register three of the runs, and the F.A.I. requires photographs of at least four to confirm a record.

At the time of going to press, therefore, the record of 650 m.p.h. set up by Major M. E. Carl in a Douglas Skystreak still stands, though further attempts by the U.S.A.F. are in the offing.

FORTHCOMING EVENTS

Sept. 12th.—City and County of Newcastle-on-Tyne: Air display at Newcastle airport, Woolsington.
Sept. 12th.—Royal Air Forces Association: Festival of the Battle of Britain at the Royal Albert Hall.
Sept. 18th to Oct. 3rd.—Copenhagen Show, organized by the F.B.I.
Sept. 18th and 19th.—Aero Club of Milan: Air rally, Forlanini airfield.
Sept. 19th.—Evere Aero Show, Brussels, Belgium.
Sept. 21st.—Aero Golfing Society: Autumn Meeting, Richmond Golf Club, Sudbrooke Park, Petersham, Surrey.
Sept. 25th.—S.L.A.E. (South Eastern Area): "Aviation Gasolines," by G. L. Coles, B.Sc., A.R.C.Sc., F.Inst.Pet., Manson House, 26, Portland Place, London, W.1, at 3 p.m.
Sept. 25th and 26th.—Butlin's Week-end Air Rally at Ingoldmells, Skegness.
Sept. 25th and 26th.—International air rally at Cervin, Sion, Switzerland.
Sept. 27th to Oct. 1st.—Fédération Aéronautique Internationale Conference, Paris.
Sept. 28th.—R.Ae.S. (Glasgow): Film Evening, Prestwick airport.
Sept. 30th.—Royal Aeronautical Society: Fourth British Commonwealth and Empire Lecture: "Some Economic Factors in Civil Aviation, with Emphasis on Civil Aircraft and their Prospective Trends of Development." Peter G. Masefield, M.A., F.R.Ae.S.
Oct. 6th.—Royal Aeronautical Society (at Birmingham): "Some Aspects of Power Plant Development" Dr. E. W. Still, B.Sc., A.F.R.Ae.S.
Oct. 13th.—R.Ae.S. (Hatfield) "Aircraft Photography," John Yoxall.
Oct. 15th.—Second International Air Ball at London Airport.
Oct. 21st.—Royal Aeronautical Society: "Cold Weather Operation of Aircraft," G. W. Wilson, A.F.R.Ae.S. and S/L. E. P. Bridgland, R.C.A.F., B.Sc., A.F.R.Ae.S.
Oct. 30th.—S.L.A.E. (South Eastern Area): "High Speed Flight," by W. A. Waterton, Esq., Manson House, 26, Portland Place, London, W.1, at 3 p.m.
Nov. 20th.—Joint Meeting Royal Aeronautical Society and Helicopter Association of Gt. Britain. Full day Discussion on Helicopter. Association of Gt. Britain. Full day Discussion on Helicopters.
Nov. 27th.—S.L.A.E. (South Eastern Area): "Gas Turbine Power Plants," by D. H. Mallinson, B.Sc., Manson House, 26, Portland Place, London, W.1, at 3 p.m.

Speed, Climb -
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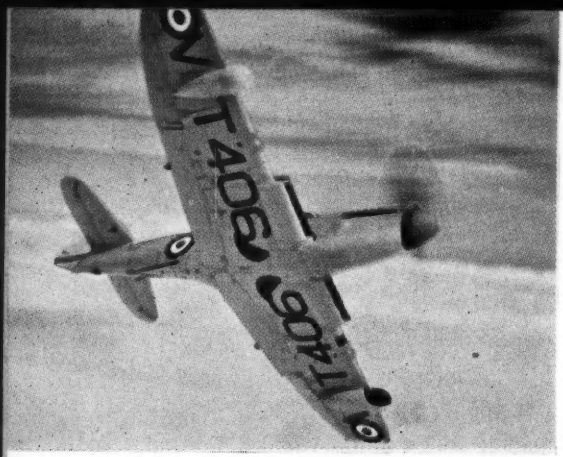

The Fairey Firefly 5, half-rolling above, is flown by a Canadian ; the D.H. Chipmunk (below) is Canadian-designed

EACH of the half-dozen types of new and not-so-new British machines depicted in the *Flight* colour photographs on these pages has some special quality, characteristic or purpose which commends it for special attention. The Fairey Firefly 5, for instance, is notable for its exceptional versatility, being a two-seater, carrier-borne type, suitable for fighting, reconnaissance and anti-submarine work.

The Canadian-designed D.H. Chipmunk, on the power of a single Gipsy Major engine, offers exceptional value as an *ab initio* trainer and has already been ordered for the R.A.F.V.R. Pilots of that thriving Service eagerly await delivery of the first "Chips," but will continue to pine for high-speed Service types, of which the Gloster Meteor 4 interceptor fighter, with its speed of 585 m.p.h., provides such an outstanding example.

The De Havilland 108 tailless research aircraft is the machine in which Mr. John Derry established the 100-km closed-circuit record of 605.23 m.p.h. on April 12th. Aerodynamically, it is one of the most advanced machines in the air to-day.

In the Short Solent flying boat we have the modern

Newly delivered Gloster Meteor 4 interceptors (two R-R Derwent 5 turbojet units) provide a reassuring spectacle at Horsham St. Faith

Basic data for the construction of the Comet airliner (D.H. 106) are being secured with the record-breaking D.H. 108 research aircraft

descendant of the wonderful old "C" Class. Powered with Bristol Hercules engines, it has a vastly improved performance and has been supplied in quantity to B.O.A.C.

Lastly, the Handley Page Hastings military transport proves that stowage space is not necessarily incompatible with a very high performance. Like the Solent, it is fitted with Bristol Hercules engines, and has certain features in common with the Hermes IV, adopted by B.O.A.C. for service on Empire routes. The pressurized Hermes IV will be distinguished by a nose-wheel undercarriage and a lengthened fuselage. Superficially the Mark VI will resemble the Mark IV, but will have a lighter structure and improved performance.

All six machines depicted here are being represented at the Society of British Aircraft Constructors' display, now in progress at Farnborough.

The Short Solent (above) is Britain's latest commercial flying boat. Below is the Handley Page Hastings, our newest Service transport

S.R.A.1

The world's first jet propelled fighter flying boat

POWERED BY TWO METROVICK "BERYL" AXIAL FLOW JET UNITS. AS SUPPLIED TO THE R.A.F.

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BRITAIN'S AIRCRAFT

THE pages which follow are more than a catalogue of current British aircraft; they form a record of twelve months of solid technical progress, the scope of which may readily be perceived if comparison is made with the corresponding issue of FLIGHT for 1947. Certain familiar machines, now somewhat *démodé*, are absent this year, and, having passed out of production, were not included in the tables of data published last week. The formidable ranks which have always been presented at these S.B.A.C. displays are, however, closed and strengthened by a variety of new and, in some instances, novel types.

Especially significant is the appearance of transport and training aircraft with gas turbine power plants—aircraft built not for research but for service, though their values as instruments for evolving new operational techniques is obvious. Some years must yet elapse before the turbine airliner is in everyday use on world routes, but the Farnborough Display signals Britain's resolve to lead.

Piston-engined transports of small, medium and large proportions; new light machines for club, private-owner, or taxi service; gliders and—especially interesting from the technical standpoint—very advanced designs of rotating-wing aircraft, provide further evidence of post-war progress. Certain of these machines exhibit a healthy dissimilarity from their foreign counterparts (where such counterparts exist) and augur well for success of unconventional designs upon which Britain's future in the air may very largely depend. Essential characteristics of forthcoming designs may be noted among the research aircraft, while the flying test beds (which themselves form a most impressive group) are fitted with early versions of the power plants earmarked for these bold projects.

Though some important classes of military aircraft, e.g., jet-propelled bombers and long-range maritime reconnaissance machines, are not represented, our latest jet fighters, together with types of less spectacular, though hardly less useful, nature, make a worthy showing. Last year the speeds of the fastest fighters displayed were somewhat below 600 m.p.h.; this week new types, making their first appearance, easily exceed that figure.

MILITARY TYPES

Auster Mk. 6 and 7

AFTER the Auster Mk. 6 "air observation post" had passed into service, it became apparent that a robust, and easily maintained machine, designed along similar lines, was required for *ab initio* training. The Mk. 7 is the answer. It is suitable not only for pilot-instruction, but for advanced training in the diverse duties of the Mk. 6.

Structurally the two marks are similar, the fuselage being of welded steel tubes and the wing of wood and metal, with fabric covering. The flaps are of stressed-skin construction and are mounted just below, and to the rear of, the wing, extending from aileron to aileron. Partly lowered, they result in unusually good take-off characteristics; fully lowered their drag ensures a short landing run.

Space is available for a camera.

Auster A.2/45

APPRECIABLY larger, heavier and more powerful than preceding Auster "air observation posts," the new A.2/45 is powered with a D.H. Gipsy Queen engine. The principal features of the design, which, considering the nature and duties of the aircraft, is commendably clean, are visible in the accompanying photograph. Note especially the sturdy undercarriage, designed to allow a very high rate of descent, and the excellent field of view allowed. Performance figures may not yet be quoted, but it is obvious that the 250-h.p. Gipsy Queen engine should give a very useful speed and rate of climb. As in previous A.O.P. aircraft, a crew of two is carried, and it may be taken that equipment conforms to the most recent requirements of the British Army.

Avro Anson T.20

TENS of thousands of pilots, navigators and radio operators remember with affection the Avro Anson, standardized by the R.A.F. long before the war. By comparison with the original Ansons, the latest Mk. 20 series (including the 21 and 22) differ widely in structure and equipment. The Anson 20 has been developed as an Empire navigational trainer; the 21 is a home service trainer; and the 22 a radio trainer. Though the all-up weight of the Mk. 20 is as high as 10,400 lb., the wing loading is only 23·7 lb./sq. ft. The cabin is 4 ft. 6 in. wide and allows ample space for personnel and equipment. Stations are provided for the training of navigators in the use of up-to-date radar equipment. Though the basic design of the Anson is many years old, there is no finer twin-engined trainer today.

Auster A.2/45

Avro Anson T.20

Avro Athena T.1

Blackburn S.28/43

Blackburn Firebrand T.F.5a

Avro Athena T1 and 2

THE two marks of Avro Athena three-seater advanced trainer differ principally in the type of power plant fitted; whereas the Mk. 1 has an Armstrong Siddeley Mamba turboprop, the second mark is powered with a Rolls-Royce Merlin 35 piston engine. The jettisonable canopy over the remarkably spacious cockpit allows an excellent all-round field of view and incorporates a two-stage amber screen for the simulation in daylight of night flying. Equipment is very complete and can include a transmitter/receiver, Standard Blind Approach and Rebecca. Dive brakes allow rapid deceleration to the maximum diving speed of 325 m.p.h.

The structure is of metal throughout, and a great deal of research has been directed towards providing maximum accessibility.

Avro Shackleton G.R.1

AS the official designation denotes, this new Avro product is intended as a long-range general reconnaissance aircraft for service with R.A.F. Coastal Command. The description "maritime reconnaissance" has also been applied. Beyond the fact that the new machine is powered with four Rolls-Royce Griffon engines (appreciably more powerful than the Merlins installed in the Lincoln bomber although physically interchangeable as power plants) little can be said.

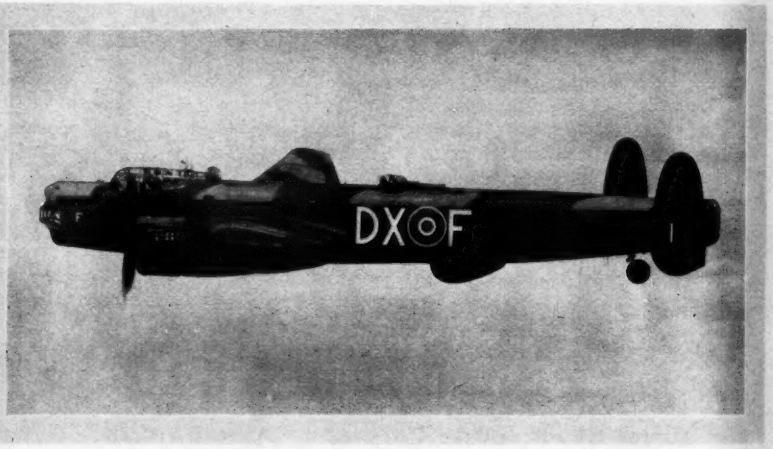
For the time being a number of "G.R." units of Coastal Command are armed with a version of the Lancaster bomber.

Blackburn S.28/43

ALTERNATIVELY known by its S.B.A.C. designation Y.A.1, and unofficially christened Firecrest, this latest Blackburn type was designed from the outset for Naval strike duties, with the alternative roles of torpedo aircraft or dive-bomber. Requirements of the specification were good forward view and tractability at low speeds. The cranked wing is of high-speed laminar-flow section, and incorporates a simple two-break power-folding system. Features of special interest are the hydraulically-operated dive brakes on upper and lower surfaces, and the inwards-retracting undercarriage which can be completely raised in about 1½ seconds.

Avro Lincoln B.2

SUPPLIED in quantity to the R.A.F. as a standard heavy bomber, the Lincoln has also been adopted by the Argentine Government. A larger machine than the Lancaster, from which it was developed, it has the same bomb capacity but surpasses the Lancaster both in range and in the measure of protection provided. Supplementing four 0.5 in. turreted guns is a dorsal turret housing twin 20 mm. cannon. A number of Lincolns fitted with special equipment have lately been employed on technical liaison missions in the course of which some noteworthy long-range flights have been recorded.



Boulton Paul Balliol T.1

Blackburn Firebrand T.F.5a

THIS latest version of the Centaurus-engined Blackburn Firebrand torpedo-fighter, as supplied to Britain's Naval Air Arm, is distinguished from earlier models by its power-operated ailerons. The Firebrand is truly a multi-purpose aircraft in that it can operate effectively as a fighter, dive-bomber, or torpedo machine. The flaps are of modified Fowler type, each flap having a subsidiary split flap, or spoiler, in the trailing edge, to provide extra drag for deck landing. Hydraulically-operated dive brakes and wing-folding gear (which enables the overall width of the aircraft to be reduced to the tailplane span) are standard.

Boulton-Paul Balliol T1 and 2

VISITORS to the S.B.A.C. Display last year will recall the amazing demonstration of manœuvrability by the Boulton - Paul P.108—the Mercury-powered forerunner of the new Balliol T.1 and T.2 advanced trainers. The Mk. 1 is powered by an Armstrong-Siddeley Mamba turboprop and is a three-seater, whereas the Merlin-engined Mk. 2 is a two-seater. The latter type is now in production for the R.A.F. and, like the turbine driven machine, has an excellent performance, achieved without prejudice to a good all-round field of view and ease of maintenance.

Approximately 40 access apertures are provided for servicing, and the majority of the pneumatic components are conveniently grouped beneath a panel on the port side of the fuselage. Folding wings and dive brakes are standard fittings and the most modern training equipment, including the two-stage amber filter screen, is specified. Deck-landing equipment is optional.

Flight trials of the Balliol T.1 (and of the Avro Athena T.1) are now in progress and are mainly concerned with the establishment of a handling technique. The fundamentally different principle of operation of the turboprop, as compared with a piston engine, makes such investigation necessary and, although the Mamba has already established an enviable reputation for reliability, the final details of handling procedure have yet to be worked out.

Many of our visitors from overseas will be unfamiliar with the characteristics of turboprop power plants, and the Balliol and Athena will afford them an opportunity of assessing noise level. Irrespective of power plant, they can hardly fail to be impressed by Britain's new advanced trainers.

Bristol Brigand B.1

AT last year's S.B.A.C. Display the Brigand T.F.1 was demonstrated most convincingly while carrying a torpedo. Current R.A.F. requirements have led to the development of the Brigand B.1, a three-seater general-purpose bomber, capable of operating as a dive-bomber, mine-layer, or day or night fighter, with correspondingly suitable tankage for each requirement. The heavy built-in armament of four 20 mm. fixed, forward-firing guns is retained whatever the duty. Bombs or a mine are carried externally beneath the fuselage, and each wing is fitted for a bomb or four rocket projectiles. The wings, undercarriage, Centaurus engine nacelles and tail unit of the Brigand are similar to those of the Buckmaster, but the fuselage is of smaller cross-section.

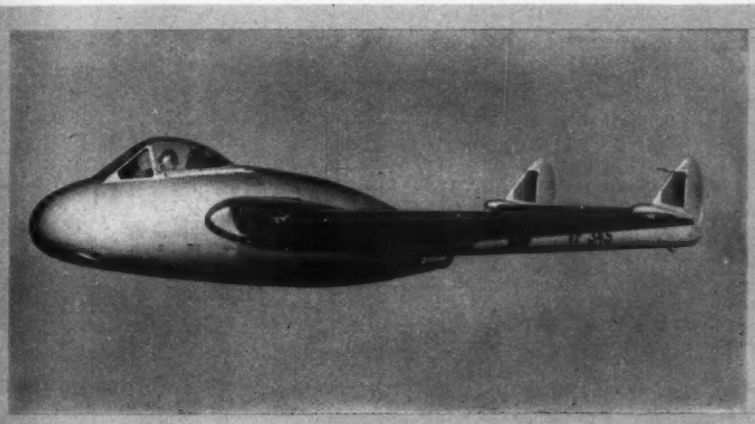
Bristol Buckmaster T.1

UNIQUE amongst the world's training aircraft, the Buckmaster is an unusually large and heavy three-seater developed for advanced flying, navigational and radio instruction. Accommodation is provided for an instructor, pupil-pilot and radio operator, and the flying controls, together with controls for undercarriage, flaps, airscrews, and throttles, are duplicated. The radio operator is seated between the main spars, and his equipment is concentrated on the port side of the fuselage.

D.H. Mosquito and Sea Mosquito

NUMEROUS marks of the historic de Havilland Mosquito continue in service in many Air Forces. The latest variant to be issued to R.A.F. squadrons is the N.F.38 night fighter, powered, like its immediate predecessor, the N.F.36 with two Rolls-Royce Merlin 113 or 114 engines, and provided with the latest developments in night-fighting radar. In addition to Mosquito fighter-bombers, bombers and photographic-reconnaissance aircraft, the R.A.F. makes use of the Mk. 3 two-seater dual-control trainer.

The Sea Mosquito, the latest version of which is the T.R.37 torpedo-reconnaissance machine, incorporates folding wings, deck-landing arrester gear and a special oleo pneumatic undercarriage. Nose-mounted radar is specified.



D.H. Vampire and Sea Vampire

LIKE other de Havilland military aircraft, the Vampire — originally designed as an intercepter fighter—is displaying exceptional versatility, having been developed as a long-range fighter, fighter-bomber and deck-landing fighter (Sea Vampire). The latest variants are the Mks. F.B.5, F.B.6, and F.B.50 fighter-bombers, specially equipped for ground-attack duties and characterized by having a wing of shorter span than preceding Vampires, exemplified by the F.3 fighter. Six of this last-mentioned type were selected to make the first transatlantic crossing by jet aircraft.

The Sea Vampire F.20 has a specially designed undercarriage.

D.H. Hornet and Sea Hornet

SUCCEEDING the Hornet F.1 in R.A.F. fighter squadrons, the Mk. 3 has increased tankage, a dorsal fin, as originally developed for the Sea Hornet, and other refinements. Even when laden to its maximum flying weight of over 21,000 lb. this type has a remarkably high performance and attains a speed of over 470 m.p.h. at 22,000 ft.

The Sea Hornet F.20 is essentially similar, but is provided with power-folding wings, deck-landing arrester gear and reconnaissance equipment to meet the requirements of British Naval Aviation. A further development of this type is the N.F.21, a two-seater developed as a strike-navigator and night fighter, and having a nose-mounted radar installation. The Merlin engine nacelles are remarkable for their compact shapeliness.

De Havilland Chipmunk

DESIGNED and developed by the de Havilland Aircraft of Canada, Ltd., as a replacement for the well-known and well-loved Tiger Moth biplane, the Chipmunk has already been ordered in quantity to equip units of the Royal Air Force Volunteer Reserve. Though of modern design, it retains a fixed tail-wheel undercarriage, with cantilever legs, and fixed-pitch airscrew, which allow adequate performance for *ab initio* instructional work. Construction is all-metal. The two tandem cockpits have a sliding hood.

Notwithstanding a tendency towards more elaborate three-seater trainers, the highly manœuvrable Chipmunk already seems assured of a succesful future.

Fairey Firefly Mk. 5

ANNOUNCED during the past year, the Mk. 5 version of the Firefly can be equipped to undertake fighter-reconnaissance, night-fighter or anti-submarine duties, being correspondingly designated F.R.5, N.F.5, or A.S.5. The new mark differs principally from the familiar Mk. 4 in the equipment installed, and retains all the features which have established the Firefly as one of the most versatile two-seater, multi-purpose machines in the world. The popularity of the type is reflected in continuing export orders. Whatever duty it is required to undertake the Firefly retains its full fixed armament of four 20 mm. guns.

A target-towing Firefly is scheduled for exhibition at Farnborough.

Fairey Operational Trainer

NOW in series production for the Royal Navy under the designation Firefly T.1, the Fairey Operational Trainer, with Griffon engine, is basically similar to the standard Firefly 1 reconnaissance fighter, the essential difference being that the rear cockpit has been raised to give the instructor a clear view forward. The type was developed with a view to overcoming the difficulties of transition experienced by some pilots when graduating from advanced training aircraft to operational types. Its field of usefulness is broadened by the retention of two 20-mm wing-mounted guns and by provision for bombs or rocket projectiles.

Fairey Primer

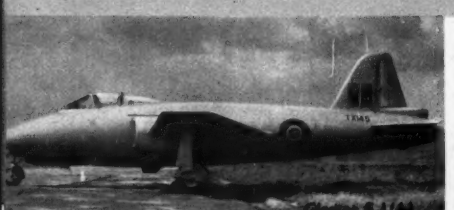
ECONOMICAL both in initial outlay and in operational costs, this two-seater *ab initio* trainer, originally designed and built during 1939 at the works of Avions Fairey in Belgium, is now offered with a Gipsy Major 10 engine (145 h.p.). or Cirrus Major 3 (155 h.p.) Arranged as a tandem two-seater (the cockpit enclosures are of unusually interesting design) the Primer is constructed mainly of metal tubes, bronze-welded by a new Fairey technique. Simple construction, using readily obtainable materials and the minimum of jigs and fixtures, was a requirement borne in mind from the outset. As an alternative to the standard metal wing, an all-wood wing has been designed.

Gloster Meteor T.7

A NEWCOMER, of more than usual interest to visitors from overseas, is the two-seater trainer version of the Meteor (Meteor T.7). This highly successful development of the Meteor intercepter fighter (2 R.R. Derwent 5) was designed to assure more gradual, and consequently, safer, introduction of pilots to the handling and navigating of jet aircraft capable of speeds in excess of 600 m.p.h. The Trainer has full dual controls and duplication of essential instruments, and, being somewhat lighter than the Meteor fighter, has a most remarkable rate of climb (7,920 ft/min at sea level). An ultimate factor of 9g at all speeds up to 600 m.p.h. is quoted, in conjunction with a Mach number up to 0.82. No armament is specified, but a camera gun and gyrosight are fitted.

Gloster Meteor F.4

ORIGINALLY developed as a high-altitude intercepter fighter (an early version was employed in combat during September, 1944) the Meteor has now been adapted for use as a fighter-bomber, ground-attack fighter and photographic-reconnaissance aircraft; there is provision, moreover, for full tropical equipment. The newest version has a lengthened nose which enables several hundreds of pounds of ballast to be eliminated. An extra 30 in allows space for another fuel tank of 100/120 gallons, supplementing the standard built-in tankage of 325 gallons and the three optional drop tanks (two of 100 gallons and one of 180 gallons capacity). Production Meteors all have complete sealing of the cockpit structure.



Gloster E.1/44

THOUGH it bears a certain superficial resemblance to the historic E.28/39—the first jet aircraft to fly in Great Britain—the E.1/44 single-jet fighter is in reality a completely different aircraft. The intakes for the single Rolls-Royce Nene turbojet are located at the wing roots, and the fuselage is of unusually broad section, permitting the stowage internally of 428 gallons of fuel. The undercarriage is of exceptionally wide track and wing-mounted air brakes, dive-recovery flaps, and spring-tab ailerons are fitted.

Handley-Page Hastings C.1

DURING the past year, one of a large number of Handley-Page Hastings C.1 military transports constructed for the R.A.F. has made a 26,000-mile demonstration flight from Britain to Australia and New Zealand, from which abundant evidence was forthcoming concerning its operational efficiency. The Hastings is characterized by a remarkably high performance (maximum speed 354 m.p.h.) and great stowage capacity. Such military equipment as bulldozers, 25-pounder anti-tank guns, or three-ton lorries, up to a total weight of 7½ tons, can be accommodated. To facilitate loading there is a large freight door and a specially constructed, air-transportable, ramp. In its heavy-stores-dropping role, the Hastings carries externally a jeep or anti-tank gun which, together with their crews and other equipment, may be dropped by parachute.

Hawker Fury and Sea Fury

EXCEPT that the Sea Fury has power-folding wings and full Naval equipment, these two compact, extremely manœuvrable, radial-engined fighter-bombers are generally similar. With two wing drop-tanks (alternatives to bombs or rocket projectiles) either type is capable of a range of the order of 2,000 miles—a quality which has made a special appeal to overseas governments which, like the Royal Navy, have standardized the Sea Fury. Features which place this type in the forefront of carrier-borne fighter-bombers are its slow-landing characteristics, with immediate positive control, and the unusually good view of the deck obtainable from the cockpit.

It is noteworthy that the wings of the Sea Fury can be folded with two 1,000-lb. bombs in position. Thus the machine can be bombed-up or fitted with rocket projectiles prior to being elevated from the hangar to the flight deck.

Hawker Fury Trainer

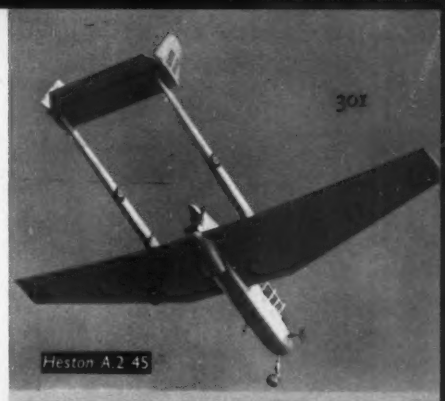
TWO types of dual-control trainer variants of the standard Fury fighter-bomber have lately been produced by Hawker Aircraft. One is a land-based version as supplied to the Iraqi Government, and the other a fully "navalized" model, designated Sea Fury T.20, to meet the requirements of the Royal Navy. The designers have made every endeavour to duplicate standard fighter-bomber features, a point of special interest being the retention of the full offensive armament in the form of bombs, depth charges, or rocket projectiles. Two 20 mm guns, with 70 rounds each, are mounted in lieu of the usual four.

Heston A.2/45

A HIGHLY unorthodox machine developed solely as an air observation post, this twin-boom pusher monoplane carries a crew of two. The general layout was determined by the consideration of making the field of view for the occupants as wide as possible. Very little ground or air activity in the vicinity of the machine could escape attention. The pusher engine entails special arrangements for cooling. A large intake incorporating ducts for cylinder cooling, oil cooling, carburettor and ventilation, is located beneath the cowling, and the cooling air is carried through a trunk to the cylinders and exhausted through an annular opening round the airscrew hub.

Percival Prentice 1 and 2

THE essential difference between the two marks of Prentice three-seat trainer, developed for the Royal Air Force, is that the first mark has a Gipsy Queen 32 engine, whereas the Mk. 2 is fitted with a supercharged Gipsy Queen 51, allowing all-round improvement in performance. In either instance a constant-speed airscrew is used. When subjected to structural strength tests at the Royal Aircraft Establishment, a Prentice airframe withstood loads appreciably in excess of 10g, for which it was designed. The Prentice had unusually elaborate equipment for an aircraft of its power, including two-stage amber screens and V.H.F. radio. Provision is made for Standard Blind Approach equipment to be installed in place of the rear seat. During the past year a Prentice has undergone winterization tests.



Hawker N.7/46

OF special interest in that it is the first jet fighter to be constructed by Hawker Aircraft Ltd., world-famous for their military machines, the N.7/46 naval fighter, which has a land-based counterpart in the P.1040, has been described as being of "split jet" design. This term denotes that although a single turbojet is fitted (Rolls-Royce Nene), by means of the Hawker "bifurcated trunk" the jet gases emerge from two outlets at the wing roots. This arrangement permits a saving of weight, more space for internal fuel tanks and a probable increase of jet efficiency due to the shortening of the jet pipes. The lines of the aircraft are exceptionally graceful, and the rumoured top speed of "well over 600 m.p.h." can well be believed.

Saunders-Roe S.R/A1

THE first jet-propelled flying boat ever built, this fighter can operate from any sheltered stretch of water of reasonable size, thus rendering unnecessary in new operational theatres a mass of airfield constructional equipment. Other advantages of such a machine were outlined in a detailed survey published in FLIGHT of July 29, 1948. Technically, one of the most interesting features is the side-by-side installation of two Metropolitan-Vickers Beryl axial-flow turbojets within the hull, a single air intake being located in extreme bow and the jet outlets positioned aft of the wing on each side of the hull.

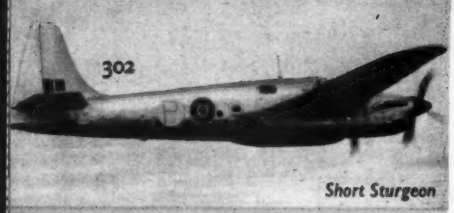
Inside the forward part of the hull is the pilot's pressure cabin, with ejection seat, and the four 20-mm guns. The wing is of high-speed profile, of single-main-spar construction, and has chordwise stiffening. The hull is of unusually high aerodynamic and hydrodynamic efficiency, and follows the latest Saunders-Roe practice in having closely-spaced frames and relatively light stringers.

Three S.R./A1s have been built to Specification E.6/44. The first has been delivered to the Marine Aircraft Experimental Establishment at Felixstowe; the second is on test at Cowes, Isle-of-Wight; and the third has been undergoing preparation for its Farnborough demonstration. Two Metrovick turbojets of only 3,500-lb. thrust are installed in the first two prototypes, but the third machine has Beryl units rated at 3,850 lb. static thrust. It has been estimated that, with the less powerful units, a top speed of 500 m.p.h. is attainable and the climb is not less than 4,000 ft./min. The additional 700 lb. of thrust should improve these figures appreciably.

Scottish Aviation A.4/45

A LIGHT military communications aircraft for specialized duty, the A.4/45 is a very robust, high-wing monoplane provided with elaborate high-lift arrangements in the form of large-area Fowler flaps and full-span leading-edge slats. In terms of percentage chord these latter are among the largest yet built, being of 25 per cent chord. To obviate tailplane stall at high angles of attack, the tail surfaces are pivoted, and are actuated by an electric screw jack. Design studies have been made of ski and float undercarriages to broaden the already wide field of usefulness of the A.2/45.

Machines now being built under the name of Prestwick Pioneer are intended for civil duties.



Short Sturgeon

Supermarine Seafire F.R.47

Supermarine Seagull

Short Sturgeon

EVERY truly modern air force of any size must be provided with target-towing and target-simulating aircraft of high performance, and the Royal Navy has adopted a version of the highly efficient Short Sturgeon monoplane, with contra-prop R.R. Merlin engines, for these duties. Originally the Sturgeon was designed as a carrier-borne reconnaissance-bomber. Although the span is about 60 ft, by careful design it has been possible to arrange for the wings to be folded to a width of only 20 ft. Full deck-landing equipment is retained in the target-towing machine, and the target drogues are stowed in the bottom of the fuselage, being operated by a power-driven winch.

Vickers-Supermarine Seafire F.R.47

A NAVAL counterpart of the Spitfire 24—last of the historic Spitfire fighter range—the Seafire 47 forms the equipment of certain Royal Naval units. Though the fuselage is basically similar to that of the Spitfire 24, an arrester hook is incorporated in the tail and fittings are provided for rocket-assisted take-off. Power-folding wings are now standard, and the Rolls-Royce Merlin two-stage supercharged engine drives a Rotol six-bladed contra-rotating airscrew. In a 30 m.p.h. wind, the take-off distance from the deck, at the normal all-up weight of 10,200 lb, is as little as 378 ft.

Vickers-Supermarine Seagull

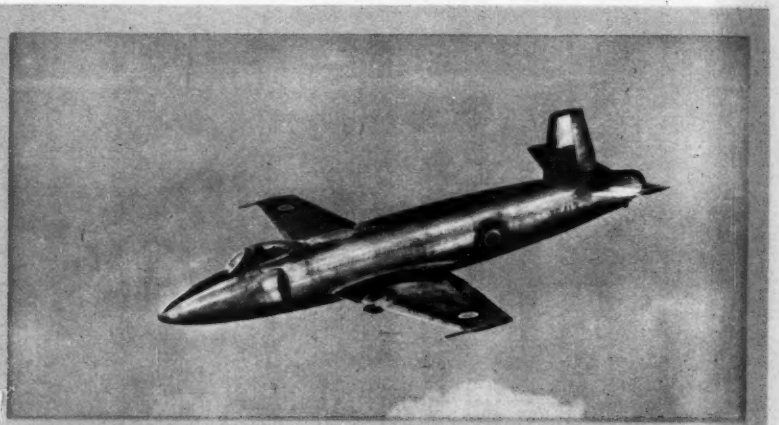
DESIGNED to succeed the Walrus and Sea Otter biplanes, the Seagull is a monoplane amphibian of exceptionally high efficiency. The most notable technical feature is the variable-incidence wing, with interconnected full-span leading-edge slots and slotted flaps. The incidence gear has already been fully flight-tested by the company on the "Dumbo" research landplane, and enables the wing to be set at the optimum angle for take-off, while in level flight the incidence can be set to reduce hull drag. For alighting it is possible to achieve the high incidence necessary to develop the lift coefficient for which the wing was designed.

The first prototype of the Seagull is equipped for air/sea rescue duties.

Vickers-Supermarine Attacker

THE Attacker, with R.R. Nene power unit, is unique among modern jet fighters in the "600 m.p.h." class in having a tailwheel undercarriage. This was one feature which gave a remarkably good account of itself during deck-landing trials of a naval version of the Attacker (distinguished from the land-based model in having lift spoilers, a deck arrester hook and long-stroke undercarriage struts).

Since the Attacker first appeared at an S.B.A.C. display, spring tabs have been fitted to the elevators and ailerons, and manœuvrability is of a high order. A pressurizing system for the cockpit has also been developed to give a differential pressure of 3½ lb/sq in.



Supermarine Spitfire Trainer

Westland Wyvern

Vickers-Armstrongs Valetta

Vickers-Supermarine Spitfire Trainer

A NOTABLY successful conversion of the Spitfire as a dual-control trainer has been accomplished by placing the forward cockpit (normally occupied by the pupil) some 13¼ in further forward than on the Spitfire, and adding a rear "stepped up" cockpit. Bearing in mind the difficulties of such a conversion, the forward view from both seats is remarkably good. Both cockpits have sliding jettisonable hoods, the rear hood being the more bulbous in shape to allow a forward view past the front cockpit. For gunnery training four 0.303 in guns are fitted as well as a camera gun in the wing fillet, and the Trainer is approved for carrying R.P.s or bombs.

Vickers-Armstrongs Valetta

BASICALLY, the Valetta is a Viking 1B adapted for military use. A heavy-duty floor is provided and in place of the normal passenger entrance is a large double door measuring 5 ft 10 in in mean height and 8 ft 6 in in width, thus permitting the loading of trucks, field guns, etc. The all-up weight has been increased from 34,000 lb to 36,000 lb, and to ensure adequate take-off and single-engine performance Hercules 230 engines are fitted instead of Hercules 634s. As a troop-carrier the Valetta accommodates thirty-six men, facing aft on each side of a central gangway. The gross stowage space is 1,565 cu ft.

Westland Wyvern T.F.1

THE only machine to be powered with the Rolls-Royce Eagle twenty-four-cylinder flat-H engine, the Wyvern T.F.1 is a deck-landing torpedo fighter. Hydraulic power-folding is provided for the laminar-flow wings, and by paying careful attention to cockpit location and fuselage form the designers have succeeded in providing a field of view for deck landing which is probably superior to that from any comparable aircraft. Flaps of unusual design allow a low touch-down speed, and large, well-balanced control surfaces ensure effective control during the approach to the deck.

It is known that British Naval air authorities are studying and sponsoring the development of turboprop units of high output and it may well be that the Wyvern may appear with such a power plant—e.g. the Armstrong Siddeley Python.

CIVIL AIRCRAFT

Airspeed Consul

ONE of the more "saleable" classes of civil aircraft in these days are the economical twin-engined machines suitable for charter operation, "executive" use, instructional and photographic work. Such a type is the Airspeed Consul, a civil version of the Oxford trainer used in vast quantities by the R.A.F. The Consul is mainly of wooden construction, with stressed-skin, ply-covered wings and a semi-monocoque fuselage. A retractable undercarriage and split flaps are standard. Two passenger seats are mounted on the front spar, a third on the rear spar (starboard side), and the remaining two are in the form of a double chair at the end of the cabin. A sixth seat can be mounted on the port side of the rear spar. The volume available for luggage stowage is 20 cu ft and a crew of two is normally carried.

The Consul is particularly well suited for use as an ambulance and various schemes for adapting it for this work have been drawn up.

Armstrong Whitworth Apollo

A FULLY-PRESSURIZED, four-engined, low-wing transport monoplane of very modern design, the Apollo can be powered with Armstrong-Siddeley Mamba turboprops, or with Rolls-Royce Merlin or Pratt and Whitney Twin Wasp piston engines. The standard version accommodates 24 to 31 passengers and freight, though provision can be made for 45 passengers and freight. Versions for freight-carrying, ambulance work, or for use as "executive" transports have been planned.

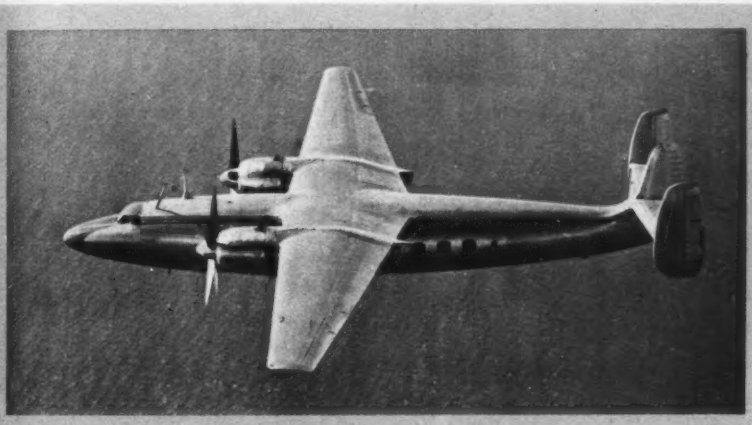
The Mamba-engined model has a maximum cruising speed of 305 m.p.h. at 20,000 ft and lands over a 50-ft obstacle in as little as 1,100 yards.

To check swing, should engine failure develop at take-off, the rudder, in production aircraft, will be divided into two portions.

At the time of writing it seems improbable that the first Apollo will be completed in time to appear at Farnborough.

Armstrong Whitworth Apollo

Airspeed Consul



Airspeed Ambassador

THE design of the Ambassador medium-stage, twin-engined airliner bears testimony to the skill and advanced thinking of British aircraft designers. Laid out as a high-wing monoplane (an unusual formula today), the machine, in standard form, seats 40 passengers in a pressurized cabin. All international safety requirements will be met, and a very wide range of high cruising speeds is available at relatively low output from the two Bristol Centaurus sleeve-valve engines. Production aircraft will be powered with Centaurus 661s which will be initially derated to deliver 2,700 h.p. for take-off. The power will be stepped up progressively to about 3,000 h.p. as circumstances and experience permit.

Auster Autocrat

BEARING a general similarity to the outstandingly successful air-observation-post machines which proved themselves during the war, the Autocrat, powered with Blackburn Cirrus Minor Series II engine, is a robust three-seater suitable for club flying, training, charter service, glider towing, survey or private ownership. The steel-tube construction stands up well to heavy landings in rough or small fields and to constant exposure to weather. Servicing—largely as a result of extensive operations by military Austers under the most trying field conditions—is remarkably easy, and the machine can carry its own "hangar" in the form of waterproof cabin covers. Dual controls are fitted as standard, and the rear seat is quickly removable to permit the stowage of over 400 lb of freight.

Auster Avis

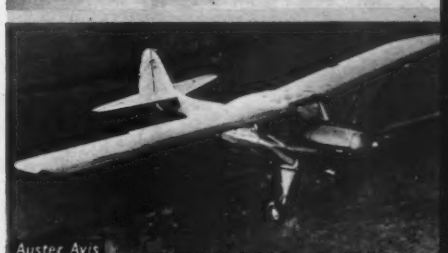
A FOUR-SEATER, suitable for the business man or charter operator, the Avis is a heavier machine than the Autocrat and is powered by a D.H. Gipsy Major X engine. An appealing feature is the four-door cabin wherein no tubes project to impede the movements of passengers. A quality emphasized by the manufacturers is the freedom from vice, and the Avis has been flown with a centre of gravity range of 21 per cent of the wing chord, an unusually high value. The disposable load is 42 per cent of the gross weight, and if the rear seats are removed it is possible to carry 730 lb of freight in addition to fuel for a range of 500 miles. Provision has also been made for the aircraft to be used as a two-seater trainer.

Avro XIX

THE commercial counterpart of the military Ansons, the Type XIX has ample headroom and incorporates a hydraulically - operated undercarriage. Large-scale production has resulted in low initial cost, and the machine is popular for passenger and freight transport, charter work and survey. Versions equipped for six, eight and nine passengers are available and the two Armstrong-Siddeley Cheetah XV engines drive two-bladed variable-pitch airscrews, allowing a cruising speed of 150 m.p.h. at 5,000 ft.

In the version equipped for photographic survey an Eagle IX or F-24 camera is fitted in the floor, aft of the rear spar, on the starboard side. For oblique photography the rear windows on each side are readily removable.

Auster Autocrat



Auster Avis

Avro XIX

Avro Tudor IV

Avro Tudor

THE manufacturers' latest figures show that the Avro Tudor IV civil transport, powered with four Rolls-Royce Merlin 621 engines and loaded to a weight of 80,000 lb, has a maximum cruising speed of 282 m.p.h. at 20,000 ft and a maximum still-air range (with accommodation for thirty-two day passengers) of 2,910 miles. The Tudor III is a similar luxury aircraft equipped with a private cabin for two passengers and—in the main cabin—day and night accommodation for eight.

The Tudor IV, which it is proposed to show, is one of those supplied to British South American Airways and operated successfully by that Corporation. A freighter version (Tudor IV B) is under development.

Bristol New-type 170

Bristol New Type 170

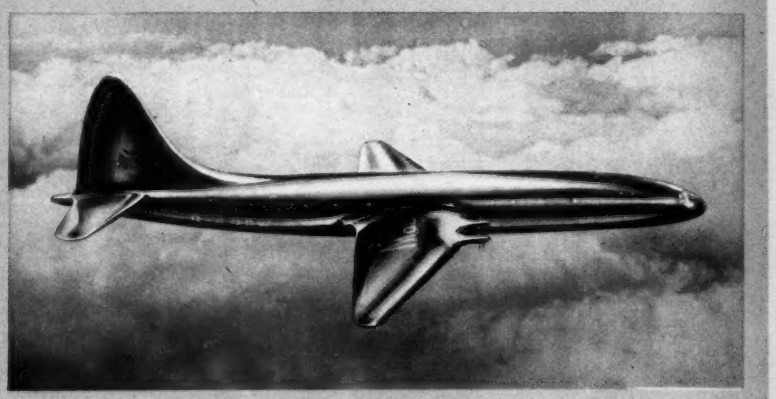
THE "1948 Model" of the Bristol 170 Freighter/Wayfarer series incorporates a structurally stiffened wing of 10 ft greater span than the original model, and various aerodynamic refinements to allow a substantially increased payload, a much longer range, and an all-round improvement in performance and handling characteristics—notably in the single-engine condition. Another new feature is the "free exit" type of cowling applied to the Hercules 672 engines, which permits the release of more airscrew thrust. Not only does this cowling reduce cooling drag and improve cooling (especially under tropical conditions) but weight is saved and operation and maintenance simplified. Variants offered are the Mk. XXI (Freighter), XXIA (Freighter for cargo/passenger work), XXIIA (Wayfarer passenger aircraft), and XXIE (mixed traffic aircraft).

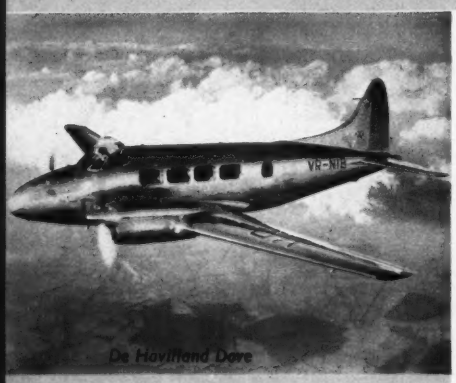
Bristol Type 175

ALTHOUGH no details are available concerning the prototypes of the Bristol Type 175 "medium-range Empire" aircraft now on order, the broad requirements—which in some instances are likely to be comfortably exceeded—can be stated. Thirty-two passengers with baggage and 2,750 lb of mail or freight are to be carried. The operating height must be about 20,000 ft at which height a cruising speed of 320 m.p.h. is demanded. A maximum still-air range of about 2,500 miles is a requirement.

Bristol Brabazon

LATE this year the first prototype of the Bristol Type 167 Brabazon I should take the air. This huge machine—precursor of the production version (Brabazon I, Mk. II), to be powered by four pairs of coupled Bristol Proteus turboprops—will have Centaurus piston engines. All major structural and aerodynamic features will, however, be common to both marks. The specification called for 100 passengers to be carried for a still-air range of 5,000 miles (ample for the London/New York service) in very great comfort, and the three main cabins seat respectively 36, 32 and 32. A crew of 13 is foreseen, including at least five stewards. All cabins will be pressurized for an equivalent altitude of 8,000 ft.





De Havilland Dove

Chrislea Super Ace

Chrislea Super Ace Series II

ONE of the most interesting of the post-war light aircraft, the Super Ace is a finely finished four-seater with a nose-wheel undercarriage. Originally developed to have hand-wheel rudder control (obviating the conventional pedals) the type is now offered with more conventional controls. The construction is of metal, except for a few minor components in wood, and the machine is chiefly fabric-covered, though the upper portion of the fuselage behind the cabin is dural sheeting and the wing leading edge and the whole tailplane are metal-skinned. Good all-round visibility and exceptional maintenance qualities should prove strong selling points.

De Havilland Dove

ONE of the most successful and popular of British commercial aircraft, the Dove may be briefly described as an 8/11-passenger twin-engined transport of all-metal construction and having a nose-wheel undercarriage. The design is of exceptional aerodynamic efficiency, and the cruising speed on half the power of the D.H. Gipsy Queen 70 geared and supercharged engines is 155 m.p.h. at 5,000 ft. The main cabin is 11 ft 9 in long, 5 ft 2½ in wide and 4 ft 6 in high, and in addition there is ample accommodation for luggage. The Dove is a fine proposition for the business executive as well as the airline and charter operator.

A military version of the Dove, known as the Devon, has been developed. This model differs from the civil machine principally in equipment.

De Havilland Comet

AT the time of writing, no illustration is available of this ultra-modern, pure-jet, high-speed, long-range airliner, the first prototype of which has been under construction at the de Havilland works for several months past. It can, however, be said that aerodynamic experience gained with the D.H. 108 high-speed tailless research aircraft is being incorporated in the design of the Comet (D.H. Type 106), and that the power plant will consist of four de Havilland Ghost turbojets rated at 5,000 lb static thrust. Cruising speeds of the order of 500 m.p.h. have been mentioned unofficially.

It does not necessarily follow that, because the wing of the Comet may resemble that of the 108, the airliner will likewise lack horizontal tail surfaces.

Elliot (Newbury) Eon

SINCE the prototype of the Newbury Eon first appeared at the S.B.A.C. Display last year, intensive development work has been in hand and the outcome will be a machine carrying four passengers with ease on the power of a 145 h.p. de Havilland Gipsy Major 10 engine. Of unusually attractive appearance the Eon is of all-wood construction and, due to the nose-wheel undercarriage and deep windscreen, the pilot has an exceptionally wide field of view.

Conversion to Gipsy Major power was completed recently after many hours of development flying with a Cirrus Minor engine. Although obviously underpowered, the early Eon nevertheless flew well as a two/three seater.

Essex Aero Sprite

A TWO-SEATER suitable for private-ownership, the Sprite is of exceptionally clean design. Constructed of magnesium alloy, it has been designed to have either a fixed or a retractable undercarriage. On 100 h.p., the cruising speed is expected to be over 130 m.p.h., and the maximum speed nearly 150 m.p.h. Design features of note are the cantilever "butterfly" tail, and clear-vision enclosure for pilot and passenger. Preliminary design calculations gave a disposable load of 670 lb for 305 miles.

Fairey Junior

THE version of this ultra-light, Belgian-designed, single-seater which it is hoped to produce in Great Britain, will have an engine of 35 to 50 h.p. The purpose of the machine is to provide really economical *flying*—not merely motorized gliding. An air test by a member of the staff of FLIGHT has shown that in spite of its diminutive size the Junior reproduces in every way the characteristics of a larger and more powerful design, and it can be safely flown in rough weather. Construction is extremely simple, and except in minor fittings, certain fuselage formers and engine cowlings, the airframe is built entirely from 1 inch-square-section spruce and small derivatives.

Of unorthodox construction, the fuselage is built round two main longerons and has been described as resembling "two ply-covered step-ladders tapering rearwards."

Fairey Junior

Essex Aero Sprite

Elliot (Newbury) Eon

Handley-Page Hermes IV, V, VI

A THOROUGHLY modern, pressurized, four-engined civil transport with a steerable nose-wheel undercarriage and reversible-pitch airscrews, the Hermes IV, with the new Bristol Hercules 763 engines, is in quantity production for service on the Empire routes of B.O.A.C. The fuselage is considerably longer than that of the tail-wheel Hermes I, counterpart of the military Hastings, and 40 or more passengers are carried with a very high degree of comfort. Structurally similar, the Mk. V Hermes is a semi-experimental machine with Bristol Theseus turboprops giving superior performance, notably in speed and climb, and the Mk. VI is a lighter development of the Mk. IV.

General Aircraft Universal

A SIMPLE, sturdy, practical machine with an unusually capacious fuselage and a relatively low performance (though adequate for the task in view), the Universal will be capable of operating from small, undeveloped airfields. A built-in hydraulically-operated ramp permits unrestricted and easy loading, and the nose-wheel undercarriage allows the floor to remain more or less level under all conditions. The reinforced cargo-compartment floor will take a load of 6,500 lb on one wheel of a vehicle. The available cargo space is 5,760 cu ft, and the uninterrupted internal dimensions are 36 ft x 10 ft x 10 ft. Dependent on the type of freight to be handled, a second removable deck can be installed for light cargo up to 1,830 cu ft capacity.

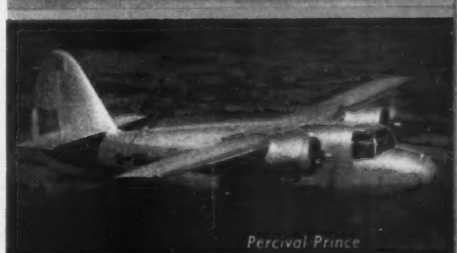
Miles Marathon

THOUGH one experimental prototype will be fitted with two Armstrong-Siddeley Mamba turboprops, production versions of the Miles Marathon to be built for the Ministry of Supply by Handley-Page Ltd., will be powered by four de Havilland Gipsy Queen 71 engines. Aft of the cockpit is the forward luggage compartment, followed by the main cabin with seating for fourteen to twenty passengers, or, alternatively, freight stowage. The cabin is remarkably roomy, considering the relatively small size of the aircraft (span 65 ft), being 18 ft long, nearly 8 ft wide and over 6 ft in mean height. The Marathon is thoroughly modern in conception and has a nose-wheel undercarriage, the main units of which have twin wheels with levered-suspension shock absorber legs. Construction is of metal throughout.

Percival Prince

THE efficiency of this new light airliner can be summarized by stating that it carries 8/10 passengers at a cruising speed of 180 m.p.h. on the power of two 500-h.p. Alvis Leonides engines. Larger than the earlier Gipsy-engined Merganser, the Prince is likewise of all-metal construction. The unusually spacious cabin is 15 ft long, 5½ ft wide and 6 ft high and there is a rear luggage compartment of 52 cu ft capacity. The direct-injection Leonides engines are in quickly removable power plants and drive de Havilland three-bladed, fully feathering airscrews. In common with the majority of new British civil aircraft, the Prince has a nose-wheel undercarriage.

General Aircraft Universal


Percival Prince

Miles Marathon

Portsmouth Aerocar

Planet Satellite

Planet Satellite

BOLD in concept and embodying very advanced structural features, the Satellite has been designed as a cheap, quiet, comfortable aircraft for private ownership or taxi work. It was found that pure monocoque construction, which was desired, could only be made practicable in such an aircraft if a material lighter than aluminium were used, and a new alloy called magnesium-zirconium has been selected. The buried D.H. Gipsy Queen 31 or Gipsy Major 10 engine drives a pusher propeller through an extension shaft, and extremely fine fuselage lines have thus been obtained. Other points of interest are the nylon crashproof fuel tanks, hinged arm-rests, which fold down to provide steps, and forced-draught engine cooling.

Structurally and aerodynamically the Satellite is perhaps the most interesting light aircraft to be built since the war.

Portsmouth Aerocar

AN idea of the purpose for which the Aerocar was designed is given by its name; four or five passengers are carried in car-like accommodation and comfort in an unusually shaped cabin slung beneath the wing and twin booms. Construction is all-metal and the wheels retract. Experience with the prototype is expected to lead to modifications resulting in reduction of structure weight, also, possibly, the fitment of twin main wheels and the provision of alternative fuselages—a larger for freight, a smaller for private-owner use. Blackburn Bombardier engines may be fitted to five-seat Aerocar Majors in place of Cirrus Major IIIs.

Short Solent

ACCOMMODATING thirty passengers by day or twenty-four by night, the Solent is the latest Short commercial flying boat, and is now in service on B.O.A.C. routes. It differs from its predecessors principally in having a larger hull and in being fitted with Bristol Hercules 637 civil power plants. The hull being 4 ft longer than in the earlier Sandringham boats, the interior designers have been encouraged to provide very lavish accommodation, and there are separate cabins, dressing rooms and a promenade deck. The crew's quarters are likewise spacious, and include a special section for resting. Very complete radio and radar equipment is installed.

Short Sealand

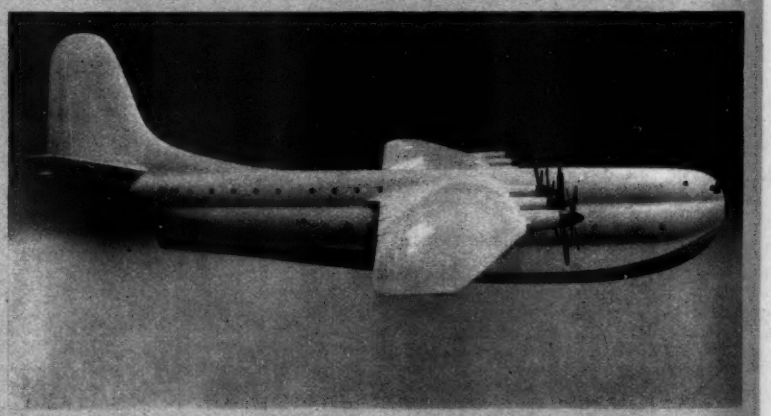
Short Sealand

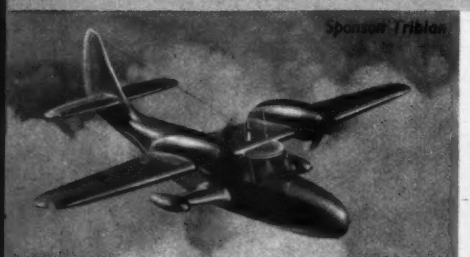
THAT there is a real demand for a small commercial amphibian is proved by the interest aroused by the Sealand, the first prototype to be produced in the Short and Harland works at Belfast. A typical layout provides for seven passengers and luggage—a good load for such a machine, considering that the total power, from the two Gipsy Queen 70 geared and supercharged engines, is 660 h.p. The Sealand is also being developed for the more powerful Alvis Leonides radials, necessitating a small increase in span and resulting in a better all-round performance, particularly at take-off and on the climb. Technically, one of the most interesting features of the Sealand is the method used for retracting the main landing wheels into the sides of the hull.

Employment of the Sealand not only for passenger and/or freight work, but as a luxury "air yacht," has been foreseen.

Saunders-Roe S.R.45

APPROXIMATING in size to the Brabazon landplane, but considerably more powerful in having ten Bristol Proteus turboprops instead of eight, the S.R.45, now under construction at Cowes, has a hull of "double-bubble" section, the midship radius of the top "bubble" being 5 ft 7½ in, and of the bottom, 7 ft 3 in. These dimensions can, however, hardly convey an idea of the spaciousness of this, the most modern marine transport aircraft in the world. Up to one hundred passengers will be carried, and all accommodation is pressurized. In order to allow cruising speeds of over 300 m.p.h., the lateral stabilizing floats are retractable into the wings, of high-speed section.





Sponson Tribian

Slingsby Motor Tutor

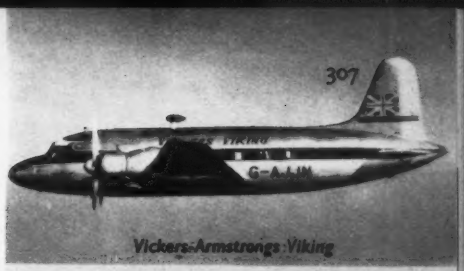
Slingsby Motor Tutor

POWERED by an Aeronca Jap flat-twin engine of 36 h.p., the Motor Tutor has been designed to meet the requirements of the Ultra-Light Aircraft Association. Tests have shown the cruising speed to be about 60 m.p.h., and the airframe has been stressed for the semi-aerobatic category, so that the machine can be looped or can perform stall turns. Slingsby Sailplanes Ltd. hope to market the Motor Tutor in kit or semi-kit form to reduce the price for the home market and lower export costs.

By comparison with the Tutor glider, the front portion of the fuselage has been redesigned and the cockpit is being moved aft, so that it is now under the mainplane.

Sponson Tribian

A NEW firm—Sponson Developments, Ltd.—will market a small 3/4-seater amphibian to be known as the Tribian, which is characterized by having sponsons with floats at their extremities for lateral stabilization on the water. This neat little machine will be of all-metal construction and will be powered by two engines (Gipsy or Cirrus). A cruising speed of about 140 m.p.h. is estimated; the stalling speed should be 55 m.p.h. and the initial rate of climb in the neighbourhood of 900 ft/min. Tiltman Langley Laboratories, Ltd., will build the prototype but a larger firm will be sought to undertake production of this most interesting and promising amphibian.



Vickers-Armstrongs Viking

Vickers-Armstrongs Viking 1B

A WELL-ESTABLISHED, medium-sized, twin-engined civil transport aircraft, the Viking 1B is available in various versions. The passenger cabin is divided into two saloons by a partition at the spar, the front saloon carrying nine passengers and the rear saloon either fifteen or eighteen. Under the floor are five large freight holds, with external doors. In common with other British civil aircraft, the Viking has a remarkably good single-engine performance; this, together with the "pull-in" windows and complete safety equipment, is one of the reasons for its popularity.

Vickers-Supermarine Sea Otter

THE Sea Otter biplane amphibian was developed from the Walrus and has increased range, a higher performance and improved accommodation, without impairment of seaworthiness and other qualities. With military equipment removed and weight suitably distributed, the machine has been effectively adapted for passenger or freight carrying. A typical layout provides for four or five seats in the sound-proofed cabin, controlled cabin heating and ventilation, and adequate luggage stowage. Side-by-side dual controls are available should the machine be required for training.

Vickers-Supermarine Sea Otter

Vickers-Armstrongs Viscount

INTENDED as the successor to the Viking, the Viscount is the first British airliner to fly with turboprop power plants (Rolls-Royce Darts). The standard version is a 32-seater, the cabin being divided into two saloons, the forward seating 12 and the aft 20 passengers. Between the saloons is the pantry. An alternative version is available as a 36-seater. The entire fuselage is pressurized (with the exception of the tail end and the nose-wheel housing) to a differential of 6½ lb/sq in, this pressure maintaining ground level conditions up to 15,000 ft. Very complete radio and navigational aids are specified, and a crew of four is proposed.

For RESEARCH and DEVELOPMENT

THE services rendered by the Avro Lancaster, Lancastrian and Lincoln are not confined to the military—or, in the case of the Lancastrian, the transport—field. Considerable numbers of these excellent machines have been ingeniously adapted for use as flying test beds, as flying laboratories for studying the performance and behaviour of new power plants, and for accumulating flying experience with these units under various conditions of flight. It has, in fact, become quite the fashion automatically to allocate one or more four-engined Avros for the testing of each new type of British turbojet or turboprop. Certain of these—the Nene- and Ghost-Lancastrians and the Theseus-Lincoln for example—may already be familiar to our overseas visitors. In most instances the power plants to be tested are installed outboard, in place of two Merlin piston engines, but the smaller turboprops are mounted in the nose of the fuselage, additional to four Merlins. The Metrovick-Lancaster differs in having a turbojet in the tail.

It has been found that whereas such combinations as the foregoing provide an excellent means of proving power plants, airframes suitable for higher performance and having passenger cabins (modern airliners, in fact) are necessary, not only for testing the turbines at higher speeds than are allowed by the bomber airframes, but for studying physiological and other problems likely to arise in developing the pure-jet 500-m.p.h. airliners of the future. Thus we have the Nene-Viking and the pressurized Tudor VIII. For collecting data at higher speeds the Gloster Meteor is available, the outboard wing installation of the jet units allowing relatively easy conversion for non-standard turbojets. The Metrovick-Meteor, due to appear at Farnborough, is the best example of such an adaptation.

At the extreme end of the speed scale is the D.H. 108—primarily a vehicle for research in high-speed aerodynamics, but at the same time a means of amassing data on the functioning of the Goblin turbojet at speeds of the order of 650 m.p.h. Such speeds are hardly approached by the Vampire in which the Goblin is fitted as standard. The Vampire has, however, brought new glory upon itself in the research field in being selected (in modified form, with long-span wings) for testing the more powerful Ghost at abnormal heights. It was during the course of development flights with the Ghost-Vampire that Mr. John Cunningham, on March 23, 1948, established the world's-record height of 59,492 ft.

Flying Wings

In addition to the types mentioned above a number of machines are flying, or are under development, for investigations in various specialized fields of research. The two A.W.52s, for example (see below), are key instruments of Britain's policy of flying-wing development and are certainly among the most ambitious aircraft yet built for pure research. In a different class is the Youngman-Baynes machine developed for tests with the Youngman high-lift

Mambo-Lancaster

Nene-Lancastrian

Theseus-Lincoln

Avro Tudor VIII

Ghost-Lancastrian

Metrovick-Lancaster

system; the Supermarine "Dumbo" from which valuable data on the characteristics of variable-incidence wings have been forthcoming; and the Reid and Sigrist Desford light twin-engined monoplane trainer, possibly to be used for special investigations at the Royal Aircraft Establishment, Farnborough. Towed gliders are exemplified by the tailless series built by General Aircraft to Ministry of Supply requirements, and by the A.W.52G, forerunner of the 500 m.p.h. jet-powered flying wing.

Official mention has been made of a research aircraft of "Delta" (triangular) form. Such a machine is likely to have an unusually high critical Mach Number, and, if fitted by one of the more powerful British turbojets—e.g. Rolls-Royce Nene—should have a truly remarkable performance.

Records of the Year

DURING 1948, one world's record and two international records have been broken by British aircraft. Details follow:

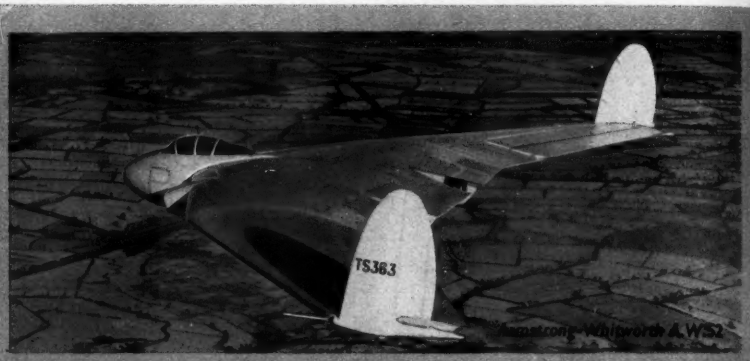
On March 23, taking off from Hatfield, Mr. John Cunningham, D.S.O., D.F.C., reached a height of 59,492 ft (18,133 m) in a modified de Havilland Vampire with a D.H. Ghost turbojet.

On April 12, flying from the same airfield, S/L. John Derry, D.F.C., broke the 100-km record with a speed of 605.23 m.p.h. (974.0259 km/hr). His aircraft was a de Havilland 108 fitted with a specially rated D.H. Goblin turbojet.

On June 28, flying the Fairey Gyrodyne from White Waltham, S/L. B. H. Arkell broke the speed record for helicopters, averaging 124.31 m.p.h. (200.0657 km/hr) over a 3-km course.

Armstrong-Whitworth A.W.52

IT is hoped that two versions of the A.W.52 tailless jet-propelled research aircraft may be present at Farnborough. The first has two Rolls-Royce Nenes (10,000 lb. max. thrust) and the second, two Derwents (7,000 lb). The wonderfully constructed, swept-back, laminar-flow wing with thermal deicing is not the only remarkable feature of the "52." There is a boundary-layer suction system which, though not altering appreciably the stalling speed, delays the loss of control due to wing-tip stalling. The wing loading, at 25.1 lb/sq ft, is relatively low.



Armstrong-Whitworth A.W.52

Vickers-Armstrong Nene-Viking

THE first passenger transport aircraft in the world to be powered solely by turbojets, the Nene-Viking is intended for research into the problems of high-altitude, high-speed commercial operation. Exhaustive investigation will be made of problems associated with noise, high-frequency vibration, climb, ceiling, take-off and baulked landings. Differences from the standard Viking 1B can be summarized as follows: increased skin gauge on main and tailplanes; new engine nacelles below the wing; re-designed undercarriage; and revised fuel and oil systems.

Nene-Viking

D.H. 108

High-altitude Vampire

D.H. 108

FOR investigation of problems of stability and control associated with aircraft having swept-back wings, the de Havilland Company has built the Type 108 to Ministry of Supply requirements. The 108 is not strictly "tail-less," in that it has swept-back fin and rudder surfaces. Lateral and longitudinal control is effected by "elevons" on the wings. The aerodynamic efficiency of the design can be judged from the fact that speeds approaching 650 m.p.h. are possible with a single specially rated D.H. Goblin turbojet. The machine to be demonstrated at Farnborough is the third prototype, in which Mr. John Derry established a 100-km. closed circuit record of 605.23 m.p.h. on April 12. It is one of the fastest turbojet aircraft in the world.

The precise thrust of the Goblin installed in the 108 may not be quoted, but is known to be greater than the 3,300 lb of the Goblin 3.

De Havilland High-Altitude Vampire

THIS most remarkable record-breaking machine is basically a standard Vampire, but has a wing of 48 ft. span and is fitted with a D.H. Ghost turbojet in place of the standard Goblin. It was calculated that 1 lb weight saved was worth 2 ft in altitude, and measures taken to save weight included the removal of all paint from the exterior surfaces, the fitting of smaller batteries in the place usually occupied by ballast, and the removal of radio and armament. With 202 gallons of fuel (sufficient for one hour's endurance) the take-off weight for the record bid was 8,400 lb. The pilot's cockpit has a metal canopy, special heater and ten compressed air bottles for emergency use.

To compensate for the very small air flow at 50,000 ft and above, the Ghost is fitted with a special high-pressure atomizer and with an additional burner-pressure gauge.

The Bristol 171—Pilot and three passengers

ROTATING-WING AIRCRAFT

ALTHOUGH, as a class, the helicopter type of aircraft is still in the development stage, it has already proved its usefulness in a number of ways, notably in the United States, where the foundations for the new art were laid by Igor Sikorsky. Many others have followed since, and for a time there was in America a spate of helicopter inventions and experiments, which resulted in a largely unwarranted enthusiasm that promised helicopters for the man in the street in the very near future.

It was soon found, however, that there was still a great deal to be learnt before the helicopter could be entrusted to largely unskilled pilots, and a saner outlook now prevails. The possibilities of the helicopter are almost unlimited, and already tasks have been found for it which could not be fulfilled by any other means.

British firms were somewhat slow in producing helicopters after the war, largely due to the basic research wisely undertaken before building was started, but they have made all the more rapid progress since, and already three British concerns have their helicopters flying, one of which established a new world's speed record by averaging 124.3 m.p.h. in bad weather. Others will make first flights before long.

Bristol

ORTHODOX in layout, in that it follows the Sikorsky single main rotor and transverse-thrust tail airscrew motif, the Bristol 171 helicopter designed by Mr. Raoul Hafner differs from that classic example in almost every mechanical detail. It is a four-seater (pilot and three passengers).

The heart of every helicopter is in its rotor head, and in the Bristol the experience of the designer with his A.R.III jump-start gyroplane of 1936-7 has been utilized to give a remarkably neat mechanism in which pitch control is effected by a three-armed "spider," the vertical movement of which alters the pitch of all three blades simultaneously, while a tilt of the spider gives cyclic pitch control.

This type of control is combined, in the Bristol 171, with a system of blade support which gives practically frictionless operation. Instead of supporting the root of the blade in thrust bearings, Mr. Hafner uses a laminated tie-rod of steel, the inner end of which is anchored to the hub. Pitch change is effected by twisting this tie-rod member. The rotor blades incorporate the usual flapping and drag hinges, with friction dampers for the latter, and drag struts connecting each blade to the next. These struts are provided with buffer pads which limit the angular movement between blades.

The rotor blades, from the outer ends of the tie rods to the tips, are of wood construction, with improved-wood laminated spars, spruce ribs, and a skin of special plywood. Anchorage to the tie-rod casing is by six steel plates, interleaved with laminations from the spar root.

Before attempting any flight tests, the Bristol Aeroplane Company put all highly stressed components through very thorough bench tests, and the rotor itself was run for long periods on the spinning tower specially built for the purpose at Filton. The result was that once flight testing began, progress was rapid, and the 171 can now be said to be fully proved, including autorotative flight.

The engine in the prototype is a Pratt and Whitney, but production models will have the Alvis Leonides, which gives 515 b.h.p. for take-off.

The protype engine is mounted vertically, but the Leonides will be in a horizontal position, the Alvis company having adapted it specially for helicopter work.

Cierva

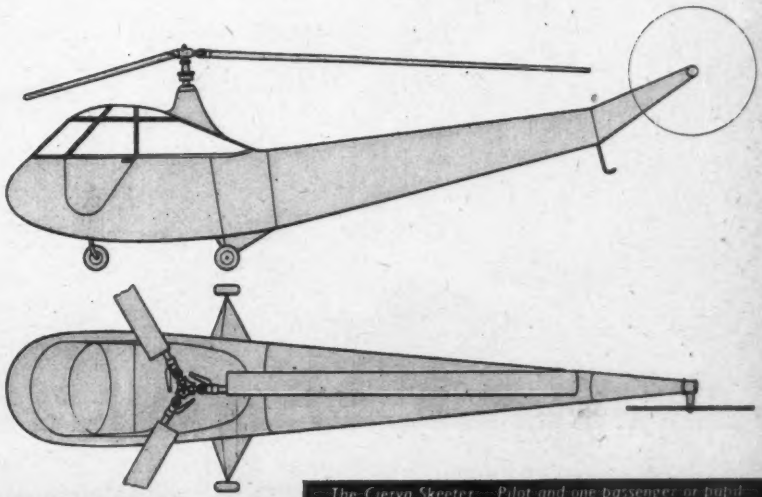
TWO new helicopters by the Cierva Autogiro Co., Ltd., are at the opposite ends of the scale in the matter of size. The W.11 Air Horse will have a gross weight of about 17,500 lb. and will carry a crew of three and 24 passengers, or a freight load of between three and four tons. The Skeeter is a small two-seater of orthodox single-rotor design.

The Air Horse is unusual in having three rotors driven by a single Rolls-Royce Merlin 24 engine. The rotors revolve in the same direction but have their planes of rotation tilted.

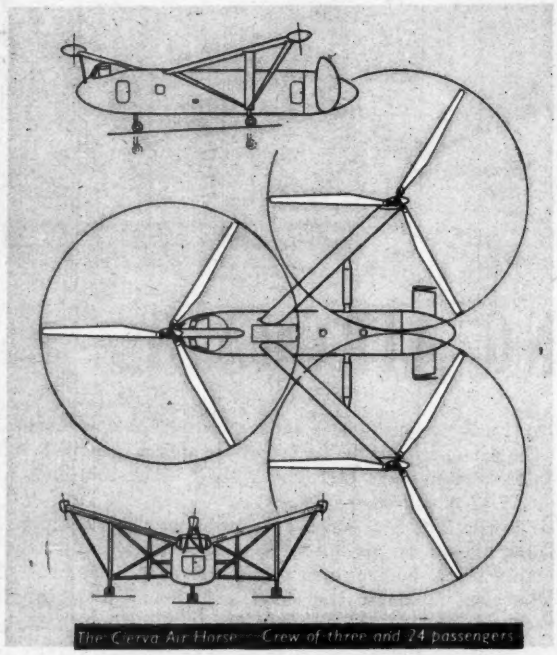
As the Air Horse is intended primarily for such duties as the spraying of crops from low altitude, the undercarriage has been designed to absorb the shock of landing in autorotative flight at a rate of descent of 42ft/sec. The special undercarriage legs were designed and manufactured by Lockheeds.

The rotor blades are of moulded wood monocoque construction with laminated leading edge. They were manufactured by H. Morris and Co., of Glasgow, in close collaboration with the Cierva engineers.

In desiging the Skeeter, the Cierva company has had low production costs prominently in mind, and it is hoped to market it, when the prototype has been put through its development tests, at a very reasonable price. Although it is initially



The Cierva Skeeter—Pilot and one passenger or pupil



The Cierva Air Horse—Crew of three and 24 passengers

intended for training helicopter pilots, it will also have its military applications, and the low price should appeal to quite a number of private owners.

The Skeeter has a single three-bladed main rotor of 29ft diameter, and the empty weight is in the neighbourhood of 800 lb. At a normal all-up weight of 1,210 lb, the cruising speed is expected to be about 75 m.p.h. The engine will be of 110 h.p., probably a Jameson.

Fairey

OUTWARDLY the Fairey Gyrodyne differs from other single-rotor helicopters in that its torque-compensating airscrew is placed on the right wing stub, thus additionally contributing much to forward propulsion at forward speeds. This reduces the stresses in the main transmission, but the arrangement also has the added advantage that the main rotor is at relatively low pitch, so that the tendency to tip-stalling at high forward speeds is reduced.

Dr. J. A. J. Bennett, in charge of Fairey's helicopter division, was long associated with the late Senor de la Cierva, and in the Gyrodyne he has retained the tilting head of the Autogiro, thereby avoiding the many levers and bearings associated with cyclic pitch control. Blade pitch bearings are eliminated, and collective pitch change is effected automatically about the flapping and drag articulations, the flapping hinges being inclined at an angle of about 60 deg in relation to the blade axes at zero torque. When torque is applied, this angle increases to a maximum of about 70 deg.

The Gyrodyne carries pilot and three passengers, with an Alvis Leonides engine. The prototype has a steel tube fuselage, but production machines will have a metal monocoque. The three-bladed rotor has a diameter of 52ft, the blades being of composite construction, with steel tube spars and wooden ribs and covering. When carrying full load, the all-up weight is 4,800 lb, and as for performance, it is sufficient to recall that S/L. Arkell established a world's speed record, homologated by the F.A.I., of 124.3 m.p.h.

Firth

BASED on Landgraf patents, the FH/01/4 Atlantic type of helicopter, two of which are now being built by Firth Helicopters, Ltd., is a twin-rotor, twin-engined machine. The rotors are of the rigid, non-articulated type, in which the equivalent of pitch change is achieved by trailing-edge flaps.

Another unusual feature is the transmission from engines to rotors. Instead of the usual shaft transmission, use is made of tension rods attached to slanting discs.

Irvin-Bell

THE Bell 47B, sales rights of which are held by Irvin-Bell Helicopter Sales, Ltd., is a small two-seater single-rotor helicopter, in which the two-bladed rotor is of the see-saw type. That is to say the blades have no flapping hinges but tilt around a central hinge, one blade rising as the other is falling. There is cyclic pitch control, and the gyroscopic effect of a stabilizing bar gives the machine a good deal of automatic stability. The all-up weight is 2,100 lb, and the engine is a Franklin flat-six. The maximum permissible speed is 92 m.p.h.

Westland-Sikorsky

IGOR SIKORSKY is the American designer who has had most experience in helicopter work, and it was therefore natural that Westland Aircraft Ltd., should choose his S-51 for construction in England. It is now in production at Yeovil, with an Alvis Leonides engine mounted horizontally. In most other respects the machine is identical with its American prototype. It carries pilot and three passengers at a gross weight of 5,100 lb. The rotor head shows the usual flapping and drag hinges, and control is by collective and cyclic pitch sticks, and pedals for controlling the pitch of the tail airscrew.

Composite rotor-blade construction is used, the tubular spar being step-tapered and the rest of the structure comprising wood ribs with a wood covering over the front 60 per cent of the chord. The trailing-edge portion is covered with two thicknesses of fabric. It is probable that later versions will have metal blades.

The Westland-Sikorsky has already done good work in this country, such as experimental mail-carrying and, in real earnest, delivering supplies to the crew of a lighthouse when bad weather prevented boats from taking the supplies to the lighthouse. It has also been employed for pest destruction with good success.

Cruising speed of the S-51 is 85 m.p.h., but what gives a better indication of its capabilities is the fact that its service ceiling (with forward speed) is 14,000ft, and its hovering ceiling, outside the ground effect, is 5,100ft.

The Fairey Gyrodyne—Pilot and three passengers

The Westland-Sikorsky S-51. Pilot and three passengers

GLIDERS

IN the years since the war the whole status of gliding has changed, and it is now generally accepted as a valuable part of flying training as well as a highly skilled sport. Official recognition of the value of gliding has come later in this country than in some others, particularly those with mountainous terrain such as Germany, Switzerland and Sweden, but increasing numbers of R.A.F. pilots are now receiving gliding experience up to an advanced standard at camps, both in Germany and at home. In addition, A.T.C. gliding continues in most parts of the country. The gliding clubs, in spite of their many difficulties, exhibit activity and enthusiasm unsurpassed in any other branch of flying. It is, therefore, appropriate that several excellent elementary and advanced instructional gliders and high-performance sailplanes should now be produced in the British Industry.

Elliots of Newbury Eons

ELLIOTS of Newbury produce three types of glider which together cover three stages of experience: the Primary Eon as an initial trainer, the Baby Eon as an intermediate training sailplane, and the Olympia Eon as a high-performance competition sailplane. The Primary Eon combines great simplicity of construction with simplicity of control. The weight empty is 264 lb and the span is 34ft 2in. The wing area is 172.5 sq ft. The wing loading is thus 2.7 lb/sq ft, and this gives a best gliding angle of 1 in 10 at 32.5 m.p.h.

Suitable for ridge and thermal soaring, the Baby Eon is particularly manœuvrable. Both tailplane and mainplane are strut braced. The empty weight is 340 lb, the wing area 153 sq ft, the span 34ft 5in, and the wing loading 3.6 lb/sq ft. The aircraft may be dived to 125 m.p.h. and the best gliding angle of 1 in 17 is achieved at 34 m.p.h. The minimum sinking speed is 2.78 ft/sec.

The Olympia high-performance sailplane design is perhaps the most widely known of all, and the Eon-built Olympia is used extensively. The weight is 420 lb, the span 49.2 ft and the wing area 161½ sq ft. The wing loading is 3.9 lb/sq ft. The best gliding angle is 25 to 1 at 45 m.p.h., the minimum sinking speed 2.2 ft/sec at 39 m.p.h., and the maximum diving speed is 130 m.p.h. At its loaded weight of 630 lb 630 lb the Olympia stalls at 32 m.p.h.

Short Nimbus

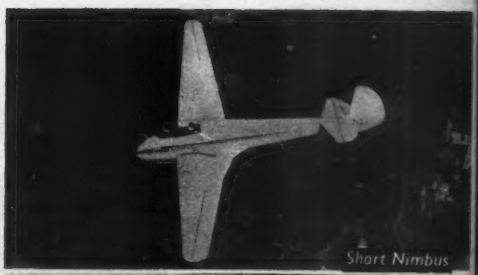
ONE of the most graceful of large, two-seater sailplanes, the gull-winged Nimbus built by Short Bros. and Harland, Ltd., may be described as lavishly equipped. It has a landing wheel with brake, full dual controls, trimmers and dive brakes. The loaded weight, two up, is 1,200 lb, and the span is 62ft. The gross wing area is 240 sq ft and the wing loading is 5 lb/sq ft. The best gliding angle is 1 in 25.8 at 37.6 m.p.h., and the minimum sinking speed is 2.3 ft/sec at 38 m.p.h. The speed range is from 130 to 35 m.p.h.

Slingsby Cadet, Tutor, Prefect, Gull and 21B

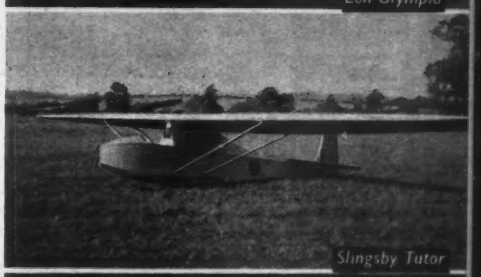
BEST known of the range of gliders made by Slingsby Sailplanes, Ltd., at Kirby-moorside, is the Kirby Cadet, many hundreds of which have been delivered, in particular to Reserve Training Command. A secondary sailplane evolved from the Cadet, similar in many details but having a wing of 5ft greater span and less square-cut form is the Kirby Tutor 2. Both these trainers have a wing area of 170 sq ft. The Tutor's span is 43ft 3½in and weight, 340 lb.

The Slingsby Prefect is the latest type of intermediate sailplane. It has above-average performance and strength, and contains a number of standard Cadet fittings. The best gliding angle is 1 in 22, and the sinking speed is 2.75 ft/sec. The span is 45ft. Construction is similar to the type 21B two-seater, which has been designed for dual instruction at gliding clubs in a machine with medium performance and a low cost price. Full dual controls, harness, instruments and spoilers are fitted to the 21B, which has a span of 54ft, wing area of 260 sq ft, and a weight of 590 lb. The best gliding angle is 1 in 21 at 42 m.p.h., and the minimum sinking speed is 2.8 ft/sec at 38 m.p.h. The stalling speed is 28 m.p.h.

Probably the most efficient sailplane in the fifteen-metres span class, the Slingsby Gull IV is a post-war high performance design. Experienced pilots have assessed the Gull IV as being 10 per cent better all round than the earlier Olympia design. The span is 49ft 10½in, the weight 467 lb, the gliding angle at 40 m.p.h. is 1 in 26, and the sinking speed 2.3 ft/sec at 38 m.p.h.


Short Nimbus

Eon Olympia


Slingsby Tutor

Slingsby 21B

Slingsby Prefect

Primary Eon

Baby Eon

Slingsby Gull IV

Pegg

Errington

Wade

Penrose

Orrell

Waterton

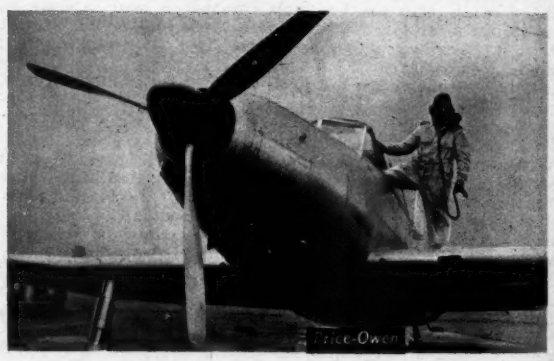
Franklin

Piper

Shepherd

DEMONSTRATORS

PORTRAYED on this page are some of the pilots who have been charged with the development flying of advanced types of British aircraft displayed at Farnborough. Many will be seen in the air during the week, and can be counted upon for classic performances. Of other names which immediately come to mind—Midgley, Sanders, Colquhoun, Weldon, Derry, Fossett, de Villiers, Pike, Murphy, Booth, Beamont, Waller, Heyworth, McDowell, Wood, Twiss, Matthews, Lindsay-Neale, Randrup, Olver, Tisshaw, Easby, Marsh, Munday, Brie, Stanbury, Zurakowski and Dryland—not to mention the illustrious Quill and Humble, who have contributed so memorably to past Displays, many also may appear.


Price-Owen

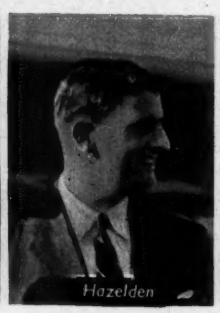
Cunningham

Summers

Tyson

Slade

Lithgow


Hazelden

Lawrence

Powell

Arkell

VISCOUNT on VIEW

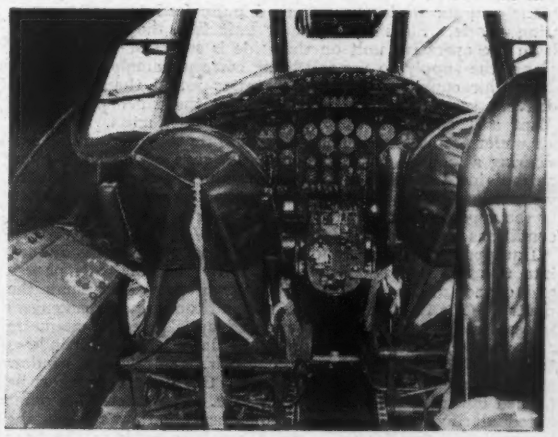
An old hand at the testing and demonstrating game, Captain Summers ensured that poor visibility should not prevent his company's guests from having a good view of the Viscount.

Exemplary Behaviour of World's First Turboprop Transport

Illustrated with "Flight" Photographs

IN its Farnborough finish—light metallic blue with dark blue and gold markings—the first prototype of the Vickers Viscount medium transport, with four Rolls-Royce Dart turboprops, stood resplendent at Wisley last Thursday under scudding rainclouds. It was generally felt that the proposed flight demonstration would be cancelled, but a brighter twinkle than usual in the eye of Captain "Mutt" Summers promised otherwise. The delightfully furnished cabins having been cleared of languishing guests, and the Darts run up till their piercing whistle rose to an almost painful pitch, the Viscount rolled rapidly on to the wet grass of the airfield. A fold in the ground partly screened the take-off, but the run was judged to be short, and with no loss of time the six wheels were up and Summers was jinking his elegant new charge low over the heads of onlookers, whose number included Mr. G. R. Strauss, M.P., the Minister of Supply.

Equipped to B.E.A. standards, the Viscount is as attractive internally as externally. The large elliptical windows are an especially commendable feature.



Though the thick structural members in the windscreen are a necessary concomitant of pressurizing, pilot vision benefits from the deep panels.

Summers' demonstration was short, but thoroughly convincing, and it was immediately evident that, in the Viscount, Vickers have not only an efficient transport aircraft but a sweet flying machine. Mr. George Edwards, chief designer, told us that since the first flight (about eleven hours have now been completed) the controls have not been touched in any way, adding with characteristic frankness that no one was more surprised than he. To have designed and built such an advanced machine in little more than two years does him and the whole Vickers-Armstrongs staff the greatest credit and, as Sir Hew Kilner, Vickers-Armstrongs' vice-chairman, remarked

Viscount on View . . . . .

in a speech, the decision not to order the type in quantity came as a great shock to the technical team at Weybridge.

That passenger carrying is, for the time being, prohibited, was another disappointment to Mr. Edwards, who was anxious that we should experience the extraordinary quiet of the cabin and the almost total absence of vibration. The low-frequency noise level is 78-85 decibels and the high-frequency level, 62 decibels, the corresponding figures for the Viking being 101 and 73. Concerning the Darts, Mr. Edwards is enthusiastic; "You can pour a bucket of stones through these centrifugals," he observed. Experience was gained prior to the first flight of the Viscount with a Dart-powered Wellington. Eventually Napier Naiad axials of greater power will be installed in the second prototype, but there will be no Mamba version as originally planned. The Darts are propelling the Viscount for 1.25 nautical air miles per gallon of paraffin, cruising at 240 kt at 20,000ft, the corresponding figure for the Viking (10,000ft, 183 kt) is 2.0.

The many unusual technical features of the Viscount, which with its excellent take-off and landing characteristics, paraffin fuel, crash-proof tanks, multiple emergency exits and duplicated undercarriage wheels, is probably the safest transport in the air to-day, must be the subject of a future detailed study. One may here remark, however, on the very long overhanging nacelles (which have displayed no tendency to "nod" in flight); high-efficiency double-split flaps; unusually large elliptical cabin windows and the complete thermal de-icing and air conditioning and pressurizing systems.

For the mainplanes, tailplane and fin, de-icing is effected by a mixture of exhaust gases, from all four engines, and of air, led through profile ducts beneath the skin of the leading edges. The inboard pair of Darts supplies the inner mainplanes, tailplane and fin while the outboard units feed the outer main wing panels. Should one power unit fail, the whole supply from the operative unit on that side is switched to the mainplane, the supply to the tail being correspondingly reduced.

The air conditioning system centres round three constant-delivery superchargers, one driven by the inner port power plant and one each by the two starboard units, supplying air under pressure to the cabin at the rate of 54 lb/min. Considering a load of 32 passengers and a crew of four, this gives an individual supply to 1½ lb per minute per person. Delivery volume being high, no recirculation is necessary. The capacity of the superchargers is such that any one will maintain 8,000ft conditions up to a height of 30,000 ft.

Equipped to B.E.A. standards, the passenger cabin is divided into two separate saloons, separated by the steward's pantry and connected by a curtained gangway passing through the pantry. The front saloon seats 12, and the rear, 20 passengers in seats constructed of steel tube and upholstered in moquette and vynide. Each of the unusually large elliptical windows is designed for use as an emergency exit. To release a window an adjacent handle is operated and the pane may then be pushed inward or outward as necessary. One interesting point noted during a necessarily brief inspection was that the steward's pantry is provisioned through a hatch in the floor which leads to an outer hatch in the fuselage skin. A power-driven servicing lift to the hatch is another innovation.

Having invited a number of guests to inspect the Viscount, the manufacturers took the opportunity at Weybridge of showing them the massive stratosphere chamber (see *Flight* of June 10th), construction of which is well advanced, and of arranging a talk by its designer, Mr. B. N. Wallis, whose engineering versatility must be without parallel in any aircraft industry. A tour was made of the shops in which the Valetta is in production for Transport Command as a replacement for the Dakota (and a very efficient one it promises to be) and, in addition, details were made available of a special V.I.P. version designed to carry from nine to 15 passengers with a high degree of comfort without, as the manufacturers put it, any pretensions to lavishness. One of the most significant features of this aircraft is the arrangement of the 25-g seats to face rearwards. The range has been increased by the addition of two 58-gallon crashproof tanks, one in each nacelle, bringing the total fuel capacity up to 840 gallons. The V.I.P. Valetta is thus capable of a still air range of 1,347 miles plus a 20 per cent reserve at normal cruising speed

On the Viscount's take-off, spectators were able to see the highly efficient double-split flaps.

The Minister of Supply, who was warmly received by the Weybridge workers, congratulated the Vickers-Armstrongs staff, and later, at a luncheon, spoke of the work of his Ministry and the products of the company. He added congratulations to Capt. Summers on his fast flights to and from Paris in the Nene-Viking. Speaking of the Valetta, the Minister disclosed that of the large order placed on behalf of the Air Ministry, a fair proportion will have been executed by the end of the year, which means that with the Hastings, Devon and York, Transport Command will be all-British in the not-too-distant future. Mr. Strauss felt quite confident that the decision to proceed with two prototypes of the Viscount was a wise one, as much valuable information—in fact almost indispensable data—would be obtained from it for the planning of future projects. There was no doubt, he continued, that we were closing up on the lead in civil aircraft which our friendly rivals, the Americans, secured during the war, and when we were in full production with our new types in the early 1950s he was confident that we should lead the world and our policy would be more than vindicated. This pronouncement, incidentally, suggests an appropriate name for the next type of airliner to be built at Weybridge—what better than Vickers Vindicator?

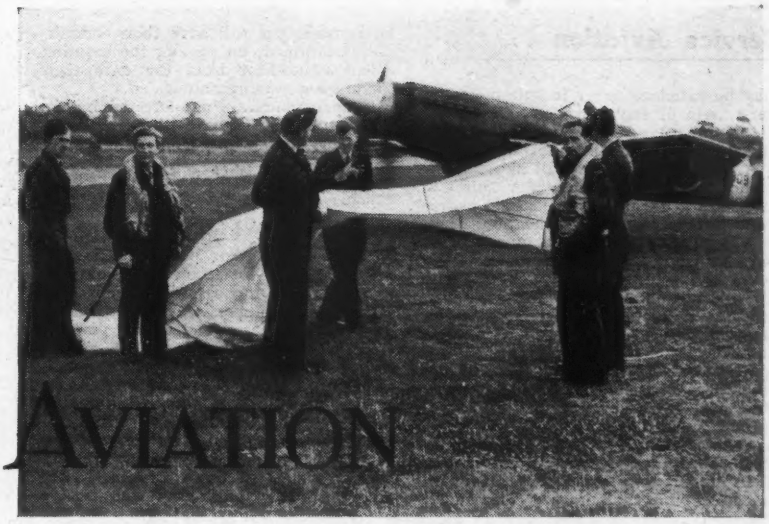
BRITISH MODEL SUCCESS

AT a recent meeting in America, a member of the British Team, R. B. Chesterton, of Northampton, succeeded in winning the Wakefield International Trophy for model aircraft. This creditable result was achieved in the face of keen competition from six countries. The contest is held in the country whose team won the trophy the previous year and this year's contest—the first since the war—was held at Akron, Ohio, on August 27th. The trophy, presented by the late Viscount Wakefield to the Society of Model Aeronautical Engineers in 1927 for competition by national teams has now been won by Great Britain six times, the U.S.A. five and France once.

The British Team was selected by means of preliminary elimination trials held throughout the country and final trials were held at Fairlop Aerodrome, Essex. A photograph appears on page 291. In view of the present currency difficulties the American controlling body undertook to sponsor the chartering of a transatlantic air liner to convey the European teams to the venue of the contest; unfortunately this arrangement broke down at the last moment and the S.M.A.E. found itself with a team but no means of getting it to the U.S.A. Nothing daunted, they set about the formidable task of raising the £1,000 necessary in the extremely short period remaining and thanks to the generous and prompt support of the members of the aircraft industry, the model aircraft trade, the clubs, and individual enthusiasts, sufficient funds were raised in time to send the team. The results must be most gratifying to the team and to those who so generously gave their support.

Royal Air Force and Naval Aviation News and Announcements

SERVICE AVIATION



SPITS AND DROGUES: Pilots of No. 611 (West Lancashire) Squadron, R. Aux. A.F., scrutinize a target used in air firing exercises from Tangmere.

Appointment

AN Air Ministry announcement states that G/C. E. W. Towsey, O.B.E., has been appointed Command Defence Officer, R.A.F. Mediterranean and Middle East Command, with the acting rank of Air Commodore. A. Cdre. Towsey was for 30 years a regular Army officer, and was appointed to a permanent commission in the R.A.F. Regiment last June.

R.A.F. Stations at Home

PART of the celebrations commemorating the eighth anniversary of the Battle of Britain will be the opening to the public on Saturday, September 18th, of 82 R.A.F. stations—ten more than last year. Due to the demands made by the Berlin air-lift, Transport Command will be able to open only four stations, compared with ten in 1947. Admission to all stations will be free, but Air Force charities will benefit from car park charges and collecting box proceeds. It is intended that the public be given every opportunity to see at close quarters how the R.A.F. works, lives and plays.

Ambitious programmes are planned for all the stations, and most will stage flying displays. These displays will be far more varied than in previous years; at R.A.F. Beaulieu, Brockenhurst, for example, the S.R./A1, Nene-Viking and Ambassador will be among the visiting aircraft, and it is hoped to stage a high-speed ejection in a Martin-Baker seat from a Meteor. Parachute-dropping and glider-towing by the Hastings and Valetta are included in the unit events. There will be a very comprehensive static exhibition at No. 20 M.U., Aston Down, apart from a flying programme of 15 events, including formation aerobatics by Spitfires, and demonstrations by the Meteor, Vampire, Tempest, Hastings and Lincoln. A list follows of all the stations open on September 18th:

County	R.A.F. Station
Aberdeenshire ...	Dyce
Angus	Edzell
Antrim, N. Ireland	Aldergrove (Belfast)
Bedfordshire ...	Cardington (Bedford)
	Henlow (Hitchin)
Berkshire	Abingdon (Oxford)
Buckinghamshire...	Booker (Bomber Command H.Q. will hold their "At Home" here)
	Halton (Aylesbury)
Cheshire	Sealand (Chester)
Cornwall	St. Eval (Newquay)
Cumberland ...	Kirkbride, Silloth
Devonshire ...	Mount Batten (Plymouth)
Dumfriesshire ...	Dumfries
Essex	Debden (R.A.F. Empire Radio School) (Saffron Walden)
Fifeshire	Leuchars (Dundee)
Glamorganshire ...	St. Athan (Cardiff)
Gloucestershire ...	Filton, Little Rissington (Cheltenham)
	Aston Down, South Cerney (Cirencester)
Hampshire ...	Calshot (Southampton), Odiham (Basingstoke), Thorney Island (Portsmouth), Middle Wallop (Bournemouth), Beaulieu
Hertfordshire ...	Bassingbourn
Huntingdonshire ...	Upwood (Peterborough), Wyton (Huntingdon)
Kent	West Malling (Maidstone), Manston, Biggin Hill, Hawkinge (The W.A.A.F. Depot) (Folkestone)
Lancashire ...	Ringway, Woodvale, Kirkham (Preston), Weeton (Blackpool)
Lincolnshire ...	Cranwell (The R.A.F. College) (Sleaford), Manby (The Empire Air Armament School) (Louth), Binbrook (Grimsby), Coningsby (Boston), Hemswell, Waddington (Lincoln)
London	Hendon
Midlothian ...	Turnhouse
Morayshire ...	Kinloss (Elgin)
Norfolk	Horsham St. Faith (Norwich), Feltwell (Thetford), Swanton Morley (Watton)
Northampton ...	Wittering (Stamford)
Northumberland ...	Acklington (Newcastle-on-Tyne), Ouston
Nottinghamshire ...	Syerston (Newark)
Oxfordshire ...	Benson (Reading)
Pembrokeshire ...	Pembroke Dock
Rutland	Cottesmore
Shropshire ...	Ternhill (Newcastle-under-Lyme) Shawbury (The Empire Air Navigation School) (Shrewsbury)
Somerset	Locking (Weston-super-Mare)
Staffordshire ...	Cosford (Wolverhampton), Lichfield
Suffolk	Stradishall, Felixstowe
Warwickshire ...	Castle Bromwich
Worcestershire ...	Defford
Wigtownshire ...	Wig Bay
Wiltshire	Melksham, Colerne, Compton Bassett (Calne), Hullavington (The Empire Flying School)
Yorkshire	Church Fenton (Leeds), Linton-on-Ouse (York), Lindholme, Thornaby, Finningley (Doncaster), Topcliffe, Driffield (Bridlington), Middleton St. George, Leconfield (Hull), Catterick (Richmond)

Stepping Up the Good Work

DURING the first half of this year the R.A.F. Benevolent Fund assisted needy ex-members of the R.A.F. and W.A.A.F. at a greater cost than ever before. The total sum dispersed was £295,735, an increase of eleven per cent on last year's rate. More than half of the 15,261 cases aided were new ones.

R.A.A.F. Renaissance

AUSTRALIA'S Minister for Air and Civil Aviation, Mr. A. S. Drakeford, said recently in Melbourne that the R.A.A.F. was now on its way up again after touching the bottom. He stated that new fighter squadrons would begin to function in October.

Shortage in Signals Trades

THE R.A.F. is anxious to recruit large numbers of men for training as radar or wireless fitters. The Berlin air-lift has placed an increased strain on the already under-manned signals organization. The work should appeal to any young man interested in wireless. Recruits may be selected for the trade of wireless fitter, entailing a 41-week course at No. 2 Radio School, Yatesbury, or for the slightly longer period of training as a radar fitter (air) or radar fitter (ground). These are all Group A trades, offering chances of promotion to warrant officer rank, while for those who are unsuitable for training as fitters there are the Group B trades of air wireless mechanic, ground wireless mechanic, air radar mechanic and ground radar mechanic. Opportunities in Group B trades are more limited but facilities will be made later for a Group A conversion course.

Trainees at Radio Schools may become student members of the R.A.F.'s own Amateur Radio Society, which is affiliated to the Incorporated Radio Society of Great Britain.

R.A.F.V.R. Entry Conditions Relaxed

THE upper age limit and the qualifications required of aircrew candidates entering the R.A.F. Volunteer Reserve are to be relaxed in special cases.

Ex-service aircrew who qualified for their flying badges may be accepted up to the age of 38 for a normal engagement of five years but this age limit

Service Aviation . . . . .

may be extended to 41 in suitable cases for a term of service which will end at the age of 43. Aircrew candidates from other services who are not up to full R.A.F. wings standard will also have a chance of acceptance for aircrew vacancies in future provided they pass a basic aircrew test on application. Ex-R.A.F. pilots not above the age limit of 30 who have carried out at least 110 hours' flying training in the R.A.F., but who did not obtain their wings may also join for a probationary period of six months' training. At the end of their probationary period of training they will continue on a normal engagement of five years if they pass the required tests, otherwise they will be discharged.

Pilot candidates for aircrew will begin as cadet pilots and will be promoted to Pilot IV if they qualify at the end of their probationary training. Similarly, ex-officer pilot candidates recommended for commissions will have their commissions confirmed, on passing the required tests, with effect from the date their commission was recommended.

Women pilots are not affected by the new regulations—those with 100 solo flying hours' experience can, as formerly, join as W.A.A.F./V.R. Flying List pilots for training at Reserve Flying Schools alongside the R.A.F.V.R.

Air Defence Unit in Wiltshire

RECRUITING has now opened at a new Air Defence Unit of the R.Aux.A.F., No. 3507, at R.A.F. Rudloe Manor Box, Chippenham, Wilts. Vacancies exist in many trades, but particularly in that of aircraft plotter. Both men and women may join for spare-time duty at this unit, and no previous service experience is required although those who have it will receive priority.

Air Defence Units form part of the Fighter Command raid reporting and control system of Great Britain. They are manned by volunteers who receive service rates of pay and allowances while in annual training, and tax-free training expenses during week-day or week-end attendances under 48 hours. The annual training comprises 15 days, part of which may be undertaken, however, under arrangement with the appropriate authority in the form of an equivalent amount of week-day or week-end attendances. There is an annual and a supplementary bounty, tax free, according to the amount of annual training performed, and travelling expenses are allowed, with a special rate and the necessary petrol coupon allowance for those using cars or motor cycles to attend for duty.

R.A.F. Transport Accident Return

DURING July transport aircraft of the R.A.F. flew 4,100,000 passenger miles. One passenger and six aircrew personnel were killed in the one accident which occurred.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

HERMES IV ACCOMMODATION
Decided in Close Consultation with B.O.A.C.

WE have read the very nice illustrated report in *Flight* of August 19th on the Hermes Mk. IV mock-up.

There are, however, one or two points on which we should comment in fairness to the customer, namely British Overseas Airways Corporation.

It is hardly right to refer to this mock-up as a "try-out for the whims of B.O.A.C." You will, we are sure, be interested to know that in the case of the Hermes Mk. IV, the mock-up represents, and indeed forms a most important and integral part of, the specification of the aircraft and as such has been agreed by the Corporation, with whom we have, throughout, had such wholehearted and helpful co-operation and cordial relations.

On the subject of "promenade space versus seat comfort," there are many and diverse views, but our own is that for 6-8-hour flights, and even those of less duration, passenger seat comfort (which is so lacking in many foreign civil aircraft) is of paramount importance, and the suggestion that the seat pitch and adjustment should be sacrificed for a few cubic feet of promenade space, which is all that would be available on this 40-seater version of the Hermes, is hardly one that merits consideration. Presumably the Corporation thought likewise.

Handley Page, Ltd. R. E. NICOLL,
Cricklewood. Sales Manager.

LIMBLESS EX-SERVICEMEN
An Earnest Appeal to All

From Major the Lord Willoughby de Eresby, M.P., T.D.

THE quiet courage of the many thousands of limbless ex-servicemen must surely provoke the admiration of us all. Today, thanks to the vast improvements which have been made in the manufacture and fitting of artificial limbs, the limbless man is no longer a conspicuous figure invoking sympathy. Yet, because he is able to hide his disability we are sometimes inclined to forget the fight he must put up to hold his own in the battle of life.

Faced with this handicap he is haunted by fear, fear that his stump might give way, depriving him of the use of artificial limbs, fear that he will be unable to support his wife and family. The increasing cost of living and family responsibilities are the cause of concern to the physically fit man, how much greater then is the concern of the limbless man. He must have someone to turn to for help.

That is why the British Limbless Ex-Servicemen's Association is appealing for greater public support. Many of the 45,000 veterans of the 1914-18 war overcame the handicaps imposed by amputation, and the majority are leading full and useful lives today. B.L.E.S.M.A. was able to help them. In the 1939-45 war a further 10,000 men suffered loss of limbs and many are now in urgent need of assistance.

I feel that all who read this will realize the need to help these disabled victims of war. All can help by sending a generous donation to the Association at the address below.

WILLOUGHBY DE ERESBY,
Chairman of the Appeal Committee,
B.L.E.S.M.A.

25, Charles St., London, W.1.

THE TUDOR MUDDLE
Condemned on Too Vague Grounds

AS I very much feared, the whole matter of the rejection of the Tudor aircraft has been allowed to pass with very little comment. You wrote strongly on the subject at the time, but the whole affair is so incomprehensible to me that I would have greatly preferred to see a good deal more fuss made.

Are we to understand that Avro's turned out a really unsatisfactory machine? Avro's of all people, who have a record of wonderful machines to their credit, machines that have become legends. Nothing definite was given out as being unsatisfactory; in fact, the alleged faults were all couched in the vaguest terms. Its length of take-off run was said to make it unsuitable for use south of Nairobi and east of Suez (or some other nonsense). Have any of these critics sat in a loaded "Atalanta" type, when taking-off south of Nairobi? Any other machine seems to have a short take-off run after that, but they did the job and they seemed to leave the ground before running out of airfield.

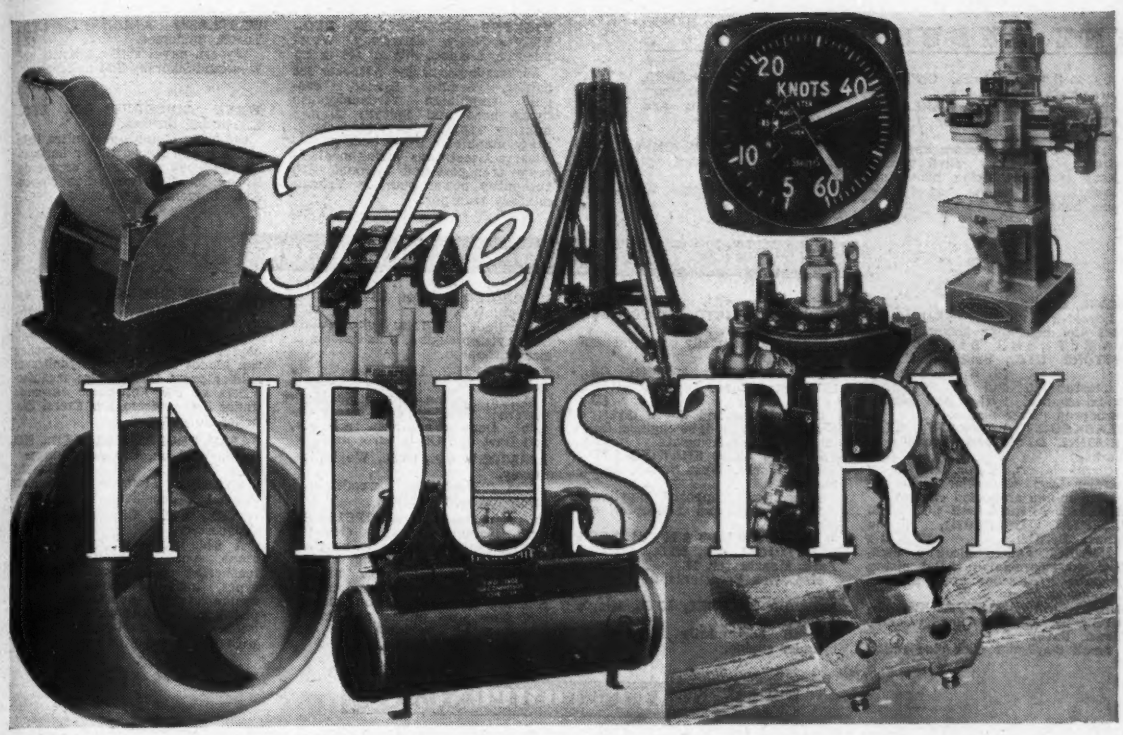
I suppose it is too much to hope that the real reasons for this awful muddle (truly muddle without parallel) will ever be allowed to come to light, but I feel it is so wrong to let it be thought that these machines are not up to standard, I find myself quite unable to believe that. I read that the chairman of Hawker Siddeley's announced in a speech that there was nothing wrong with the Tudors that could not easily be put right.

As far as the ordinary person can see, these Tudors have been condemned on the ground and have not been given a proper chance to prove themselves.

What a different story would have been told if there had been real co-operation, from start to finish, between all the parties concerned. Even now, one hears that the Tudor II is to be chopped about a bit more before being used as a freighter.

Let us hope, therefore, that when we settle down to using machines built by Esquimaux and serviced in Timbuctoo, our flying will lose us less than it did last year.

Guildford, Surrey. W. R. CARR.



AN AIRCRAFT display and exhibition such as that staged at Farnborough by the Society of British Aircraft Constructors serves many useful purposes, not the least of which is the realization which it brings of the enormous variety of highly specialized products which go to the making of a modern aircraft. Nearly all of these are hidden away inside the finished machine, their very existence being therefore unsuspected by many as the aircraft flashes by overhead. Yet without the thought and care and labour put into any one of these items, the aircraft would be prevented from discharging its functions efficiently.

In the following pages will be found the names and addresses of several hundred firms which together form Britain's Aircraft Industry, many of which are exhibiting at Farnborough. Where that is the case, a stand number or letter is given after the name.

To facilitate reference, the firms have been grouped into sections, and mention is made of their chief products.

AIRCRAFT

AIRSPEED, LTD., The Airport, Portsmouth, Hants. **(A.)**
Ambassador medium transport and Consul light transport.

ARMSTRONG WHITWORTH AIRCRAFT (SIR W.G.), LTD., Baginton Coventry. **(J, K, L, M & N.)**
Apollo turboprop-powered medium transport nearing completion. Two versions of A.W.52 tail-less research aircraft now flying.

AUSTER AIRCRAFT, LTD., Rearsby Aerodrome, Rearsby, Leicester.
Autocrat and Avis light aircraft and Auster Mark 7 trainer. Also A.2/45 and A.O.P. Mark 6 Artillery Observation Aircraft.

BLACKBURN AIRCRAFT, LTD., Brough, E. Yorks. **(Q.)**
Firebrand T. F. Mark 5A and Blackburn S.28/43 naval strike aircraft.

BOULTON PAUL AIRCRAFT, LTD., Wolverhampton. **(P.)**
Balliol Marks 1 and 2 advanced trainers.

BRISTOL AEROPLANE CO., LTD., Filton House, Bristol. **(F & U.)**
Bristol 167 Brabazon long-range transport, New Type 170 medium-range transport, and 171 helicopter.

CHILTON AIRCRAFT, LTD., Hungerford, Berks.
Single-seat ultra-light aircraft, no longer in production. Currently light engineering.

CHRISLEA AIRCRAFT CO., LTD., Exeter Airport, Clyst Honiton, Devon.
Super Ace Series 2 taxi and private-owner type.

CIERVA AUTOGIRO CO., LTD., **(No. 57.)**
Southampton Airport, Southampton.
Two-seater Skeeter helicopter and W.11 Air Horse large transport helicopter.

DE HAVILLAND AIRCRAFT CO., LTD., Hatfield, Herts. **(B.)**
Several marks of Vampire jet fighters, Hornet and Sea Hornet fighters and bombers, and Mosquito reconnaissance aircraft. Also Dove short-range transport. Comet 106 jet-propelled transport under development.

ELLIOTTS OF NEWBURY, LTD., Albert Works, Newbury, Berks.
Gliders and Eon light plane.

ENGLISH ELECTRIC CO., LTD., Warton Aerodrome, Nr. Preston, Lancs.
Producing de Havilland Vampires and aircraft of own design.

ESSEX AERO, LTD., The Airport, Gravesend.
Aero Sprite light aircraft being developed.

FAIREY AVIATION CO., LTD., Hayes, Middx. **(E.)**
Firefly naval aircraft and Primer and Operational Trainers. Fairey Gyrodyne recently established world's record speed of 124.3 m.p.h. for helicopters.

FIRTH HELICOPTERS, LTD., 32, Clarges Street, Piccadilly, London, W.1.
Two FH/61/4 "Atlantic" twin-engined, twin-rotor helicopters now being built.

GENERAL AIRCRAFT, LTD., Feltham, Middx. **(O.)**
G.A. Universal short-range four-engined transport.

GLOSTER AIRCRAFT CO., LTD., Hucclecote, Glos. **(J, K, L, M & N.)**
Meteor and E.1/44 single-seater fighters, and Meteor T Mark 7 jet trainer.

HANDLEY PAGE, LTD., 40, Claremont Road, Cricklewood, London, N.W.2. **(T.)**
Hermes 4, 5 and 6 civil transports, and Hastings military transport. Will build Miles Marathon civil transports.

HAWKER AIRCRAFT, LTD., Canbury Park Road, Kingston-on-Thames, Surrey. **(J, K, L, M & N.)**
N.7/46 jet fighter, Sea Fury piston-engined fighter, and Fury Advanced Trainer.

HESTON AIRCRAFT CO., LTD., Heston Airport, Hounslow, Middx.
A.2/45 Artillery Observation Aircraft.

IRVIN - BELL HELICOPTERS SALES, LTD., Icknield Way, Letchworth, Herts.
Concessionaires for Bell 47B and 47D helicopters.

PERCIVAL AIRCRAFT, LTD., Luton Airport, Beds. **(Z.)**
Prince short-range transport and Prentice basic trainer.

PLANET AIRCRAFT, LTD., 29, Clarges Street, London, W.1.
Satellite taxi and private-owner type.

PORTSMOUTH AVIATION, LTD., The Airport, Portsmouth.
Aerocar short-range light transport.

REID & SIGRIST, LTD., Walton Lodge, Kirby Muxloe, Leics.
Desford trainer.

A. V. ROE & CO., LTD., Greengate, Manchester. **(J, K, L, M & N.)**
Lincoln bomber, Shackleton reconnaissance machine, Athena and Anson advanced trainers. Avro Tudor long-range transport and Avro XIX short-range transport.

SAUNDERS-ROE, LTD., Osborne, E. Cowes, Isle of Wight. **(B.)**
S.R.45 long-range transport flying boat with ten Bristol Proteus turboprops. Also S.R./A1 jet-propelled flying-boat fighter.

SCOTTISH AVIATION, LTD., Prestwick Airport, Ayrshire.

THE INDUSTRY . . . . .

A.4/45 light transport. Civil version: Prestwick Pioneer.

SHORT BROTHERS & HARLAND, LTD., Seaplane Works, Queens Island, Belfast. **(W.)**

Sturgeon reconnaissance and target-tower aircraft. Civil types: Solent transport flying boat and Sealand short-range amphibian flying boat.

SLINGSBY SAILPLANES, LTD., Ings Lane, Kirkbymoorside, York.

Gliders, sailplanes and Motor Tutor.

SPONSON DEVELOPMENTS, LTD., 3, Albemarle Street, Piccadilly, London, W.1.

Tribian short-range amphibian flying boat.

VICKERS - ARMSTRONGS, LTD., Vickers House, Broadway, Westminster, London, S.W.1. **(H & I.)**

Vickers-Supermarine Attacker jet fighter, Seafire fighter, Seagull amphibian reconnaissance flying boat and Spitfire Trainer military types. Sea Otter short-range amphibian flying boat (civil). Vickers-Armstrongs Viking medium-range transport and Viscount with turboprop power plants. Valetta military transport.

WESTLAND AIRCRAFT, LTD., Yeovil, Somerset. **(E.)**

Wyvern naval strike aircraft and Westland-Sikorsky S-51 helicopter.

WREN AIRCRAFT CO., LTD., Kirklinton, Carlisle.

Gold Crest single-seat ultra light aircraft and four-cylinder horizontally opposed two-stroke engine designed for it. Production suspended. Currently light engineering.

POWER PLANTS and AIRSCREWS

ALVIS, LTD., Coventry. **(X.)**

Leonides 9-cylinder radial transport and helicopter power plants.

ARMSTRONG SIDDELEY MOTORS, LTD., Parkside, Coventry. **(J, K, L, M & N.)**

Cheetah 15 and 25 7-cylinder radial engines. Python and Mamba turboprop power plants.

BLACKBURN AIRCRAFT, LTD. (ENGINE DIVISION), Brough, E. Yorks. **(Q.)**

Cirrus Minor, Major, and Bombardier and Grenadier light inverted in-line air-cooled engines.

BRISTOL AEROPLANE CO., LTD. (ENGINE DIVISION), Filton House, Bristol. **(F & U.)**

Hercules and Centaurus high-powered sleeve-valve radial piston engines. Theseus and Proteus turboprops.

CROSS MANUFACTURING CO., LTD., 33, Midford Road, Combe Down, Bath.

Small 3-cylinder air-cooled radial engine design with rotary valves.

COVENTRY VICTOR MOTOR CO., LTD., Coventry.

Small horizontally opposed engine designs.

DE HAVILLAND ENGINE CO., LTD., Stag Lane, Edgware, Middx. **(D.)**

Gipsy Major and Queen inverted 4- and 6-cylinder light engines. Goblin and Ghost turbojets.

JAMESON AERO ENGINES, LTD., Spring Works, West Street, Ewell, Surrey.

Horizontally opposed 4-cylinder light aircraft and helicopter engines.

METROPOLITAN-VICKERS ELECTRICAL CO., LTD., Trafford Park, Manchester, 17.

Metrovick Beryl axial-flow turbojet.

MONACO ENGINES, LTD., King's Langley, Herts.

Small horizontally opposed 4-cylinder engine.

D. NAPIER & SON, LTD., Acton, London, W.3. **(G.)**

24-cylinder H-form sleeve-valve Sabre piston engine. Naiad medium-size turboprop.

ROLLS-ROYCE, LTD., Nightingale Road, Derby. **(Y.)**

Merlin, Griffon and Eagle high-powered liquid-cooled piston engines. Derwent and Nene turbojets, and Dart and Clyde turboprops.

AIRSCREW CO., LTD., Weybridge, Surrey.

The "Weybridge" wooden airscrew for light aircraft.

de HAVILLAND PROPELLERS, LTD., Hatfield, Herts. **(No. 11.)**

Wide range of hydraulic, constant speed airscrews, featuring feathering and reverse-thrust braking types, both single-bank and contra-rotating and for piston engines and turboprop units; also manually-operated variable-pitch airscrews for light aircraft.

HORDERN-RICHMOND, LTD., Hydulignum Works, Haddenham, Bucks. **(No. 112.)**

Airscrews, airscrew blades, helicopter tail totors, engine cooling fan blades and various hydulignum rubber press form tools; manufacturers of the Aeromatic airscrews under licence from the Everel Propeller Corporation.

JABLO PROPELLERS, LTD., Mill Lane, Waddon, Croydon, Surrey. **(No. 94.)**

Makers of airscrew blades from laminated densified wood.

ROTOL, LTD., Cheltenham Road, Gloucester. **(No. 53.)**

A wide range of hydraulic constant speed airscrews, including feathering and reversible pitch types, both of single-bank and contra-rotating conformation, for piston engines and airscrew turbine units. Hollow spinners for use with airscrew turbine units.

AIRCRAFT COMPONENTS

AEROPLASTICS, LTD., Earl Haig Road, Hillington, Glasgow, S.W.2. **(No. 146.)**

Cooling fans for helicopters, pilots' seats and complete range of standard S.B.A.C. plastic parts, including accumulator trays, parachute stowage brackets, handwheels and filler caps.

AIRCRAFTINGS, LTD., Power Road, Gunnersbury, London, W.4. **(No. 56.)**

Fuel system components, petrol cocks, filters, pumps, etc.

AIRCRAFT MATERIALS, LTD., Midland Road, London, N.W.1. **(No. 115.)**

Comprehensive range of A.G.S., B.S.S. and A.S. parts and components.

AVIATION CORPORATES, LTD., Pall Mall, London, S.W.1. **(No. 95.)**

Specialists in flexible pipes in synthetic rubber for all fuel, oil, hydraulic, air and instrument services for aircraft and workshop and test equipment; suitable for low-medium and high pressures and a wide range of temperatures.

AVIATION DEVELOPMENTS, LTD., Kingsbourne House, 229, 231, High Holborn, London, W.C.1. **(No. 34.)**

Pip quick-release pins, especially for seat fixing giving interchangeability with freight-lashing rings; Chobert rivets.

AVIMO, LTD., Taunton, Somerset. Fireproof couplings.

BARBER & COLMAN, LTD., Brooklands, Manchester.

Shakeproof thread-cutting screws, anti-vibration lock washers.

BLACKBURN AIRCRAFT, LTD., Brough, East Yorks. **(Q.)**

The patent "Tharra" rivet for blind or "buried" riveting.

BLOCTUBE CONTROLS, LTD., Bicester Road, Aylesbury, Bucks.

Mechanical control systems.

BOORN, THOMAS, & CO., LTD., 89-91, Crescent Lane, S.W.4. **(No. 79.)**

Fire-resisting hose, fittings and couplings.

BRITISH MESSIER, LTD., Cheltenham Road East, Gloucester. **(No. 55.)**

Aircraft wheels incorporating hydraulically operated "Multi Spot" disc brakes.

BRITISH PARACHUTE CO., LTD., Collington Road, Cardiff.

Emergency dinghies, parachutes for supplies and aircrew personnel.

BRITISH WIRE PRODUCTS, LTD., Stourport-on-Severn, Worcs. **(No. 40.)**

'Tru-lay" wire rope and "Truloc" compression fittings for cable flying controls and cable assemblies.

BROWN BROTHERS (AIRCRAFT), LTD., Houghton Road, Northampton. **(No. 129.)**

A wide range of A.G.S., B.S.S. and S.B.A.C. standard parts, together with one-piece Oddie nuts and plastic roller bearings.

BROWN, DAVID, & SONS (HUDDERSFIED), LTD., Park Gear Works, Huddersfield. **(No. 131.)**

High-tensile steel castings, especially for undercarriage wing fitting, engine mounting and other specialized applications.

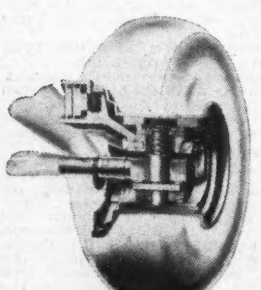
BROWN, E. G., & Co., Ltd., West Road, Tottenham, N.17.

Sheet metal components, including petrol and oil tanks, pilots' seats, fairings and light stampings.

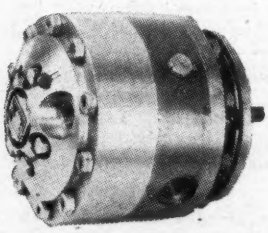
BRUNTONS (MUSSELBURGH), LTD., Musselburgh, Scotland.

Bracing wires and control rods; steel wire cables; "Beacon" swaged sheet for use with "Beacon" pre-limit cable.

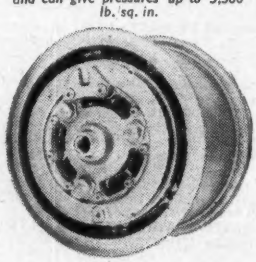
Girling master cylinder for hydraulic brake actuation.



Single disc brake unit with cross-wind landing gear manufactured by Goodyear's.

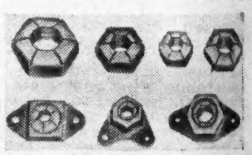


This Integral hydraulic pump delivers 3,3 gallons a minute at 3,000 r.p.m. and can give pressures up to 3,300 lb./sq. in.

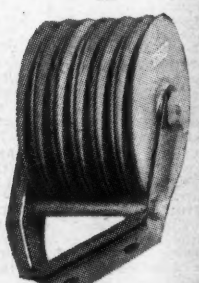


(Left) British Messier produce this main undercarriage wheel unit for the Meteor.

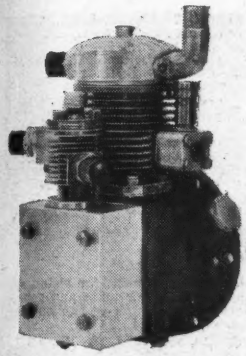
(Above) The Prince nose undercarriage by Electro-Hydraulics Ltd.



Oddie nuts and anchor nuts are produced by Brown Brothers (Aircraft) Ltd

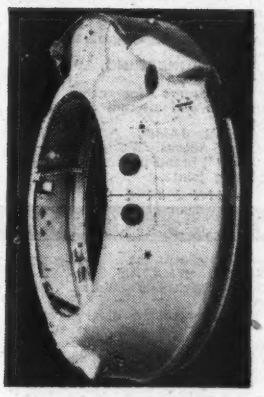


Typical control cable fairlead multiple pulley assembly in Tufnol.

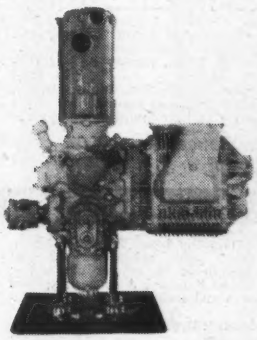


(Above) *This Hymatic three-stage air compressor, weight 7¼ lb., has an output of 2 cu ft per minute and a pressure range up to 3,000 lb./sq. in.*

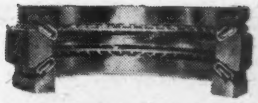
(Below) *Tecalemit Micro Pump for gas turbine or supercharger lubrication.*



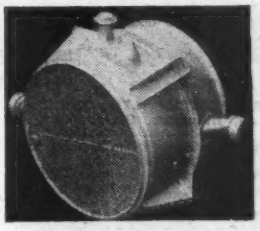
Cowling for Hastings with Bristol Centaurus engines fabricated by Cornercroft Ltd.



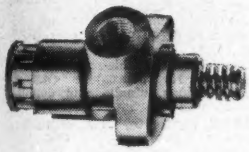
This Rotol gear box is fitted with all its accessories including a Marshall cabin blower and Dowty hydraulic pump.



Double row tapered roller airscrew bearing manufactured by British Timken Ltd.

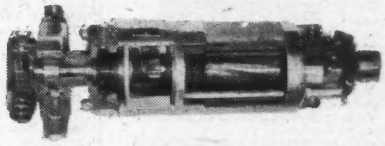


An oil cooler as fitted to the Hermes IV, weight empty 86 lb., produced by Delaney Gallay Ltd.



SOME ENGINE COMPONENTS AND ACCESSORIES

Plessey electrically-driven torch ignition pump with 1/6 h.p. motor and 4 : 1 reduction gear.



THE INDUSTRY . . . .

CARR FASTENER CO., LTD., Stapleford, Notts.
Makers of "Dot" fasteners for a wide variety of purposes.

CORNERCROFT, LTD., Ace Works, Coventry. **(No. 158.)**
Sheet metal spinnings and pressings.

DELANEY GALLAY, LTD., Vulcan Works, Edgware Road, Cricklewood, London, N.W.2. **(No. 24.)**
Cabin heating equipment employing an engine exhaust steam generator; lightweight fuel tanks; radiators; coolers and heat exchangers in light alloy, copper and stainless steel.

DELCO-REMY-HYATT (DIVISION OF GENERAL MOTORS), LTD., 111, Grosvenor Road, London, S.W.1. **(No. 160.)**
Wills' pressure-filled joint rings and unions.

DOWTY EQUIPMENT, LTD., Arle Court, Cheltenham, Glos. **(No. 17.)**
Undercarriage units, fuel pumps, bonded seals, liquid spring shock absorbers.

DZUS FASTENER (EUROPE), LTD., 164, 168, Westminster Bridge Road, London, S.W.1. **(No. 153.)**
The Dzus self-locking fastener for the attachment of aircraft cowlings, panels, instrument mountings, access doors, etc.

ESSEX AERO, LTD., The Airport, Gravesend, Kent.
Welded magnesium fuel and oil tanks with filters and gauges, and welded magnesium windscreen frames.

EXPANDED RUBBER CO., LTD., 675, Mitcham Road, Croydon.
Expanded rubber, ebonite, plastic materials and sheeting for air craft bulkheads and furnishings.

FIREPROOF TANKS, LTD., The Airport, Portsmouth. **(No. 42.)**
Fuel tanks, valves and traps, tank fittings and self-sealing materials.

THE FAIREY AVIATION CO., LTD., Hayes, Middx. **(E.)**
S.B.A.C. standard range of components, including filler caps, drain valves, pressed-end clips and quick-release pins.

FIRESTONE TYRE & RUBBER CO., LTD., Great West Road, Brentford, Middx. **(No. 122.)**
Pneumatic tyres and tubes, and bonded rubber-to-metal anti-vibration mountings.

THE GOODYEAR TYRE & RUBBER CO. (GREAT BRITAIN), LTD., Wolverhampton. **(No. 26.)**
All-Weather Tread aircraft tyres; single-disc wheel and brake assemblies, and cross-wind landing gear.

GUEST, KEEN & NETTLEFOLDS (MIDLANDS), LTD., Box No. 24, Heath Street, Birmingham, 18. **(No. 5.)**
Wood screws, bolts and nuts, set screws, "Aerotight" nuts, rivets, cotter pins; Nettlefold-Parker-Kalon hardened, self-tapping screws; hammer drive screws, screw nails, cold-forged socket screws and set screws, Nettlefold-Patent-Phillips recessed-head screws, etc.

HARLEY AIRCRAFT LANDING LAMPS, Paxton Hill, St. Neots, Hunts. **(No. 36.)**
Various types of landing lamps and manœuvring and taxying lamps.

HEADLAND, THOS. P., LTD., 164-168, Westminster Bridge Road, London, S.E.1. **(No. 152.)**
A.G.S. parts and materials, Dzus fasteners, cutting tools, hand tools, steels, machine tools, welding materials and airfield equipment.

THE HOFFMANN MANUFACTURING CO., LTD., Chelmsford, Essex.
Ball and roller bearings for both piston-type engines and gas turbines.

KING AIRCRAFT CORPORATION, 5th Street, Montrose Avenue, Hillington, Glasgow, S.W.2. **(No. 6.)**
Fireproof flexible pipe couplings; oil filters; flush-fitting toggle fasteners; feed-line strainers; drain valves and range of S.B.A.C. standard components.

LINREAD, LTD., Sterling Works, Cox Street, Birmingham, 3.
Rivnuts, Phillips' recess-head screws and bolts, cold-forged bolts, screws and solid and tubular rivets, nuts, light pressings, etc.

MARSTON EXCELSIOR, LTD., Wolverhampton. **(No. 109.)**
"Flexelite" fuel tanks utilising a recently developed material, giving greater flexibility and lower weight; light-alloy air-to-air heat exchangers, and cabin coolers.

M.C.L. & REPETITION, LTD., Poole Lane, Langley, Birmingham.
Set screws, securing screws, ball joints, pipe fasteners, locating screws and a wide variety of repetition products and details.

MOLLART ENGINEERING CO., LTD., Kingston By-Pass, Surbiton, Surrey. **(No. 138.)**
Range of M.E. patent and Hooke's-type universal joints; prototype aircraft assemblies.

D. NAPIER & SON, LTD., The Vale, Acton, London, W.3. **(G.)**
Toggle-action and screw-action flush fasteners for cowling panels, access panels, etc.

ODDIE, BRADBURY & CULL, LTD., 504, Portswood Road, Southampton.
"Oddie" quick release cowling fasteners, pins and cupboard fasteners.

THE PALMER TYRE, LTD., Herga House, Vincent Square, London, S.W.1. **(No. 124.)**
Aircraft tyres, wheels and brakes; non-slip matting for wing walkways.

THE POWER FLEXIBLE TUBING CO., LTD., Derby Works, Finsbury Park, N.4.
Revolution counter and windscreen wiper drive casings in brass or bronze and aluminium cabin heating pipes.

POWIS, DAVID, & SONS, LTD., Incorporating Birmingham Wirework Co., Ltd., Forward Works, Golden Hillock Road, Sparkbrook, Birmingham 11.
Aluminium alloy rivets in all recognized specifications, split cotter pins in mild and stainless steel to A.G.S. requirements.

PYTRAM, LTD., Pytram Works, Dunbar Road,, New Malden.
Laminated cellulose fibre material for hot air ducts and pipes, fairings, moulded panels, instrument cases, seamless air ducting and prototype models.

THE PULSOMETER ENGINEERING CO., LTD., Nine Elms Iron Works, Reading.
Range of tanks, fuel pumps and electric motors, pumps for water and other fluids.

RANSOME & MARLES BEARING CO., LTD., Newark-on-Trent, Notts.
All types of ball and roller bearings, including needle roller units supplied for aircraft controls, airscrews and landing wheels.

REDWING LTD., Redwing House, Stafford Road, Croydon, Surrey. **(No. 22.)**
Aircraft components made from sheet, extrusions and castings in magnesium alloy.

THE RENOLD & COVENTRY CHAIN CO., LTD., Renold Works (P.O. Box No. 5), Didsbury. **(No. 31.)**
Chains, attachment links, connectors, biplanar blocks and cable spools for aircraft control systems.

REYNOLDS TUBE CO., LTD., Birmingham. **(No. 125.)**
Aircraft components fabricated from steel tubing.

ROTHERHAM & SONS, LTD., Coventry.
A.G.S. couplings, strainers, fillers and caps.

RUBERY, OWEN & CO., LTD., Darlaston, South Staffs. **(No. 157.)**
Aircraft pressings, pressed and welded fabrications, mechanical sub-assemblies and general aircraft sundries.

L. A. RUMBOLD & CO., LTD., Kingsgate Place, Kilburn, N.W.6. **(No. 66.)**
Aircraft furnishing and soundproofing equipment, chairs, leg rests, tables. Elektron, light alloy and component manufacturers.

SALTER, GEORGE, & CO., LTD., West Bromwich, Staffs.
Springs and roller bearings of a large variety of types.

SAUNDERS-ROE, LTD., Osborne, East Cowes, Isle of Wight. **(R.)**
Main support and wing-tip floats for a variety of aircraft types.

SAUNDERS VALVE CO., LTD., Cwmbran, Monmouth. **(No. 58)**
The Saunders manually and electrically actuated diaphragm glandless cock.

SELF-PRIMING PUMP & ENGINEERING CO., LTD., Edinburgh Avenue, Trading Estate, Slough, Bucks. **(No. 68.)**
Range of fuel booster pumps, improved inverted flight valves, non-return valves and tank float valves.

SERCK RADIATORS, LTD., Warwick Road, Birmingham, 11. **(No. 38.)**
Radiators, coolers and heat exchangers for all purposes.

SILENTBLOC, LTD., Victoria Gardens, Ladbroke Road, Notting Hill Gate, London, W.11.
Anti-vibration mountings and flexible bearings of all kinds.

SIMMONDS AEROCESSORIES, LTD., Treforest, Glam. **(No. 121.)**
Pinnacle metal diaphragm nuts; Simmonds elastic stop nuts, Hi-shear stop pins, Spire nuts and clips, and Spinloc nuts.

STONE, J., & CO., LTD., Deptford, London, S.E.14. **(No. 23.)**
Castings and forgings in steel and aluminium alloys.

TELEFLEX PRODUCTS, LTD., Teleflex Works, High Road, Chadwell Heath, Essex.
Aircraft control and cabin window operating equipment.

TERRY, HERBERT, & SONS, LTD., Redditch, Worc.
Springs, presswork, cable mechanisms, flexible shafts, washers and Anglepoise lamps.

THE INDUSTRY . . . .

T.K.S. (AIRCRAFT DE-ICING), LTD., Drayton House, Gordon Street, W.C.1. **(No. 77.)**
Aircraft de-icing equipment.

TRIPLEX SAFETY GLASS CO., LTD., Triplex Works, Hythe Road, N.W.10. **(No. 46.)**
All types of safety glass windscreens, plastic hoods, panels, windows, interior cabin fittings, and lighting equipment.

VOKES, LTD., Henley Park, Guildford, Surrey. **(No. 163.)**
Specialists in filtration of air, oil, fuel; filters and silencers for cabin blowers and air-conditioning apparatus.

VULCANISED FIBRE LTD., Guildford, Surrey. **(No. 96.)**
Vulcanised fibre jettisonable fuel tanks, also components manufactured from vulcanised fibre, including fairleads, cleats, gaskets, sheet rod and tube.

WADE ENGINEERING, LTD., The Airport, Gatwick. **(No. 23.)**
Superchargers for cabin pressurization and internal combustion engines.

WALKER, JAMES, & CO., LTD., "Lion" Works, Woking, Surrey.
"Lion" brand packings for heat-resisting joints.

WESTON, CHARLES, & CO., LTD., Irwell Bank Works, Douglas Green, Pendleton, Salford, 6.
Gits oil seals, and Weston oil retainers in synthetic rubber and chrome leather.

WOKINGHAM PLASTICS, LTD., 41, Eastcheap, London, E.C.3. **(No. 83.)**
Windscreen fairings, pilots' canopies, double-skin non-misting windows, wing-tips, astrodomes, and a variety of components in plastic materials.

ENGINE COMPONENTS and ACCESSORIES

AEROPLASTICS, LTD., Earl Haig Road, Hillington, Glasgow, S.W.2. **(No. 146.)**
Cooling fans for helicopters and turbine compressor blades.

AMAL, LTD., Holford Works, Perry Barr, Birmingham, 20. **(No. 103.)**
Fuel pumps, float chambers, pressure-regulating and non-return valves, filters, oil thermometer pockets, flame traps, ball and roller joints, and cowling fasteners.

ANDRE RUBBER CO., LTD., Kingston Bypass, Surbiton, Surrey.
Rubber-encased ice-guards for air intakes, rubber-bonded anti-vibration mounting and thrust bearings; synthetic rubber collapsible hose; and flexible couplings for auxiliary drives.

A.V.A., LTD., 45-47, York Street, Twickenham, Middlesex.
Vibration absorbers and Oscillith flexible bushes.

BIRMINGHAM ALUMINIUM CASTING (1903) CO., LTD., Birmid Works, Smethwick, Birmingham, 40. **(No. 136.)**
Aluminium pressure and gravity die-castings and sand-castings for crankcases, cylinder blocks, pump bodies and other components; sand-castings in magnesium alloy.

BRITISH THOMSON HOUSTON CO., LTD., Rugby. (No. 52.)
An extensive range of B.T.H. ignition equipment.

BRITISH TIMKEN, LTD., Cheston Road, Aston, Birmingham, 7.
Tapered roller bearings for aircraft engines and airscrew bearings.

BROWN, DAVID & SONS (HUDDERSFIELD), LTD., Park Gear Works, Huddersfield. **(No. 131.)**
Centrifugal castings in heat-resisting alloys, both for piston engines and gas turbine components; reduction gears, variable-pitch airscrew gears, timing gears, camshaft gears and pump gears.

COOPERS MECHANICAL JOINTS, LTD., 14, Liverpool Road, Slough, Bucks. **(No. 123.)**
Laminated brass labyrinth rings; copper and asbestos washers; shims in brass, copper and steel; "Rubex" jointing materials, and filters and strainers for all applications.

CORNERCROFT, LTD., Ace Works, Coventry. **(No. 158.)**
Engine cowlings, ductings, cover plates and supporting rings.

DELANEY GALLAY, LTD., Vulcan Works, Edgware Road, Cricklewood, London, N.W.2. **(No. 24.)**
Radiators, coolers and heat exchangers in light alloy, copper and stainless steel.

ENGLISH STEEL CORPORATION, LTD., Vickers Works, Sheffield. **(No. 10.)**
Special steel discs for gas turbine engines.

E.N.V. ENGINEERING CO., LTD., Hythe Road, Willesden, London, N.W.10. **(No. 114.)**
Bevel, helical and straight tooth spur gears.

FIRTH, THOMAS, & JOHN BROWN, LTD., Atlas and Norfolk Works, Sheffield, 1. **(No. 112.)**
Impeller couplings, turbine shafts, reduction gears, main bearing studs, airscrew shafts, connecting rods, bolts, etc.
Drop-forged hubs and spiders, and nitrided thrust races for variable-pitch airscrews.

FISCHER BEARINGS CO., LTD., Upper Villiers Street, Wolverhampton.
Roller and ball bearings for both reciprocating and gas-turbine engines.

HEPWORTH & GRANDAGE, LTD., St. John's Works, Bradford.
Pistons, piston rings, cylinder liners and gudgeon pins.

HOBSON, H. M., LTD., Hobson Works, Fordhouses, Wolverhampton. **(No. 148.)**
Carburation equipment of a wide variety of types, including master control injection carburettors and direct injection equipment.

ISO-SPEEDIC CO., LTD., Coventry.
Aircraft engine governors and speed controlling equipment.

JESSOP, WILLIAM, & SONS, LTD., Brightside Works, Sheffield, 1. **(No. 60.)**
High-temperature steel forgings for gas turbine discs, gas turbine blades and high-duty valves.

K.L.G. SPARKING PLUGS, LTD., Roehampton Vale, S.W.15. **(No. 3.)**
Sparking plugs, ignition harness accessories, igniter plugs and thermocouples for gas turbine engines.

LODGE PLUGS, LTD., Rugby. **(No. 12.)**
Sparking plugs for all British, American and European aircraft engines, and igniter plugs for jet engines.

LUCAS, JOSEPH, LTD., Great King Street, Birmingham, 19. **(No. 87.)**
Range of fuel equipment components for gas turbines, including variable displacement fuel pumps and component systems.

MARSTON EXCELSIOR, LTD., Wolverhampton. **(No. 109.)**
Light alloy radiators, intercoolers, and header tanks.

MARTIN-BAKER AIRCRAFT CO., LTD., Higher Denham, Uxbridge, Middx.
Pitch control system for airscrews, and a special oiling unit for contra-rotating types.

THE PALMER TYRE, LTD., Herga House, Vincent Square, London, S.W.1. **(No. 124.)**
Silvoflex fireproof flexible hose for control, lubricant and fuel feed-lines.

THE PLESSEY CO., LTD., Ilford, Essex. **(No. 76.)**
A variety of pump units for fuel feed, priming and throttle de-icing; and solenoid-operated valves.

RANSOME & MARLES BEARING CO., LTD., Newark-on-Trent, Notts.
All types of ball and roller bearings, including needle roller units for piston engines and gas turbines, superchargers, etc.

ROTAX, LTD., Willesden Junction, London, N.W.10. **(No. 86.)**
Ignition equipment for piston engines, and starter units and generators for use with piston engines and gas turbines.

SALTER, GEORGE, & CO., LTD., West Bromwich, Staffs.
Springs and roller bearings of a wide variety of types.

SERCK RADIATORS, LTD., Warwick Road, Birmingham, 11. **(No. 38.)**
Radiators, coolers and heat exchangers for all purposes.

SIMMS MOTOR UNITS, LTD., Oak Lane, East Finchley, London, N.2.
Magnetos and drive couplings.

THE SKEFKO BALL BEARING CO., LTD., Luton.
Single- and double-row ball and roller bearings, angular contact ball bearings, single- and double-thrust ball bearings.

STONE, J., & CO., LTD., Deptford, London, S.E.14. **(No. 23.)**
Castings and forgings in steel and aluminium alloys.

TECALEMIT, LTD., Great West Road, Brentford, Middx. **(No. 47.)**
Metering pumps for lubrication systems and filters for lubricating and fuel oil.

TERRY, HERBERT, & SONS, LTD., Redditch, Worcs.
Springs, presswork, cable mechanisms, flexible shafts, washers and Anglepoise lamps.

VANDERVELL PRODUCTS, LTD., Western Avenue, Acton, London, W.3.
Plain bearings in lead bronze and anti-friction metals.

WELLWORTHY PISTON RINGS, LTD., Lymington Hants. **(No. 28.)**
Cast and pressed pistons, and piston rings and sealing rings of various types.

WESTON, CHARLES, & CO., LTD., Irwell Bank Works, Douglas Green, Pendleton, Salford, 6.
Gits oil seals and Weston oil retainers in synthetic rubber and chrome leather.

AUXILIARY CONTROLS and SERVICES

AUTOMOTIVE PRODUCTS CO., LTD., Leamington Spa, Warwick. **(No. 83.)**
The "Servodyne" hydraulic servo controller; S.B.A.C. standard pressure fuelling coupling; self-sealing Avery coupling; Lockheed hydraulic valves and jacks for all purposes; oleo-pneumatic shock absorber struts; arrester hook equipment; Lockheed-Avery fire-proof hoses, and Purolator metal-element filters.

BOULTON PAUL AIRCRAFT, LTD., Wolverhampton **(P.)**
High-fidelity electro-hydraulic power control system.

BRITISH MESSIER, LTD., Cheltenham Road East, Gloucester. **(No. 55.)**
High-pressure servo controls, hydraulic flow divider for synchronizing jacks independently of load.

DANIEL, D. A., & CO., LTD., Maengwyn Street, Machynlleth, North Wales.
Wick and spray type heaters for cabin and de-icing application, heater fuel control units, combustion air regulators, fuel pressure switches and rated flow valves, and ram air pressure switches.

DOWTY EQUIPMENT, LTD., Arle Court, Cheltenham, Glos. **(No. 17.)**
Hydraulic and electro-hydraulic actuating systems.

DUNLOP RUBBER CO., LTD., St. James's House, St. James's Street, London, S.W.1. **(No. 142.)**
Brakes, pneumatic systems, valves, jacks, electro-pneumatic valves, de-icing systems and pumps, flap control units, flexible fireproof hoses, windscreen wipers, aircraft tyres.

ELECTRO HYDRAULICS, LTD., Warrington, Lancs. **(No. 154.)**
Hydraulic and electro-hydraulic and pneumatic components and systems, together with undercarriage units.

ENGLISH ELECTRIC CO., LTD., Queen's House, Kingsway, London, W.C.2. **(No. 161.)**
A wide range of electrical equipment, including devices for power flight control; alternators and geared drives of low power/weight and bulk ratios.

EVERSHED & VIGNOLES, LTD., Acton Lane Works, Chiswick, London, W.4.
Electronic speed controller and governor, providing a rapid and accurate all-electric method of controlling and governing the speed of gas turbine engines.

EXACTOR CONTROL CO., LTD., 108, Park Street, London, W.1.
Self-sealing pipe couplings, and hydraulic remote control systems.

FAIREY AVIATION CO., LTD., Hayes, Middx. **(E.)**
The Fairey hydraulic power-assisted flying control system.

GENERAL ELECTRIC CO., LTD., Kingsway, London, W.C.2. **(No. 118.)**
Lighting, ventilating and signalling equipment.

GIRLING, LTD., Kings Road, Tyseley, Birmingham. **(No. 69.)**
Self-adjusting hydraulic brakes, master cylinders, differential mechanisms, supply tanks and parking devices.

GODFREY, SIR GEORGE, & PARTNERS, LTD., Hampton Road, Hanworth, Middlesex. **(No. 71.)**
Aircraft cabin pressurized equipment, including superchargers and air-conditioning equipment.

GRAVINER MANUFACTURING CO., LTD., Graviner Works, Gosport Road, near Fareham, Hants. **(No. 89.)**
Fire-fighting and fire-suppression equipment, and automatic actuator and fire detector devices.

HOBSON, LTD., H. M., Hobson Works, Fordhouses, Wolverhampton. **(No. 148.)**
Power flying controls and push-button hydraulic control for undercarriage operation.

HYMATIC ENGINEERING CO., LTD., Redditch, Worcs. **(No. 119.)**
Large range of pneumatic and compressed air equipment, including the latest 1,000 lb/sq in aircraft system.

INTEGRAL, LTD., Cousins Street, Dudley Road, Wolverhampton. **(No. 147.)**
"Integral" hydraulic pumps, control valves and other components.

NORMALAIR, LTD., West Hendford, Yeovil, Somerset. **(No. 16.)**
Cabin atmosphere control equipment for pressure cabins, in civil and military aircraft.

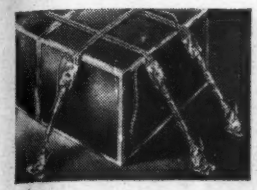
THE PALMER TYRE, LTD., Herga Works, Vincent Square, London, S.W.1. **(No. 134.)**
Hydraulic, pneumatic and mechanical actuating systems; ram units, reducing valves and controls; B.T.R. de-icer equipment.

PYRENE CO., LTD., 9, Grosvenor Gardens, London, S.W.1. **(No. 132.)**
Range of fire-fighting equipment and fire detection systems for aircraft.

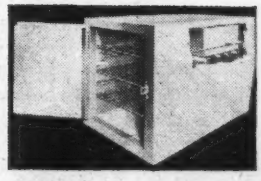
ROTAX, LTD., Willesden Junction, London, N.W.10. **(No. 86.)**
Aircraft lighting systems; de-icing units and a variety of electric actuators.

ROTOL, LTD., Cheltenham Road, Gloucester. **(No. 53.)**
A range of auxiliary gear boxes and automatic synchronizing equipment.

SIMMONDS AEROCESSORIES, LTD., Treforest, Glam. **(No. 121.)**
Simmonds flexible Corsey controls.



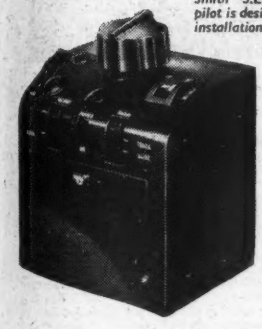
Aerolex buckle fittings for securing freight.



An A.S.T. food storage refrigerator.

R.F.D. typical civil aircraft dinghy complete with emergency survival pack.

This controller unit of the Smith S.E.P.1 automatic pilot is designed for central installation in cockpits.



(Above) A Schermuly aircraft emergency landing flare.

(Left) : A Rumbold aircraft chair.

(Right) : Controllable aircraft chairs by Wingham, Bennett and Co., Ltd.

THE INDUSTRY . . . . .

TEDDINGTON CONTROLS, LTD., Cefn Coed, near Methyr Tydfil, S. Wales. **(No. 37.)**
The Teddington electronic cabin-temperature controller for use where the thermal input to the cabin can be varied by alteration of the cabin inlet temperature.

TRIUMPH ENGINEERING CO., LTD., Coventry.
6 kW. D.C. auxiliary generating plant.

TURNER MANUFACTURING CO., LTD., Wulfruna Works, Villiers Street, Wolverhampton.
Oleo pneumatic undercarriage, nose and tail wheels; hydraulic dampers for helicopter rotor blades.

VICKERS-ARMSTRONGS, LTD., Vickers House, Broadway, Westminster, London, S.W.1. **(H, I.)**
A wide range of standard fuel cocks, and power control units.

MILITARY AIRCRAFT EQUIPMENT

AEROLEX LTD., Camberley, Surrey. **(No. 150.)**
Quick-release buckles, snap hooks, coupling sleeves, roller hooks, wire lashing gear, and anchorage points.

FERRANTI, LTD., Hollinwood, Lancs. **(No. 100.)**
The Mk. 4E gyroscopic gun sight.

G.Q. PARACHUTE CO., LTD., Stadium Works, Woking, Surrey. **(No. 28.)**
Various types of parachute and harness, including the paratroop "Statichute" as used by the British and Allied airborne forces.

IRVING AIRCHUTE OF GREAT BRITAIN LTD., Letchworth, Herts. **(No. 85.)**
Seat- back- and pack-type parachutes for personnel; Irvin harness, and special parachutes for dropping paratroops, food supplies and the heaviest airborne equipment.

KING AIRCRAFT CORPORATION, 5th Street, Montrose Avenue, Hillington, Glasgow, S.W.2. **(No. 6.)**
Hydraulically-operated inertia lock release-gear for Sutton harness.

LINES BROTHERS, LTD., Morden Road, Merton, S.W.19. **(No. 35.)**
The L.B.1 radio target, intended for training anti-aircraft ground units; automatic tow-cable release-unit for use with towed gliders; and an automatic skid-shoe brake developed for use with towed pilotless gliders.

MALLOCK-ARMSTRONG CO., 39, Victoria Street, London, S.W.1.
"Nosonic" ear defenders.

MARTIN-BAKER AIRCRAFT CO., LTD., Higher Denham, Uxbridge, Middx.
Martin patent flat-feed for guns and cannon, and the Martin-Baker ejector seat.

R.F.D. CO., LTD., Catteshall Lane, Godalming, Surrey. **(No. 110.)**
Aircraft dinghys, life-jackets, and survival equipment of all types.

SCHERMULY PISTOL ROCKET APPARATUS, LTD., Spray Works, Park Gate, Newdigate, Surrey. **(No. 64.)**
Pyrotechnic apparatus, including parachute flares, distress signals, Verey cartridges, landing flares, rocket line-throwing apparatus, and smoke-flame wind indicators.

COMMERCIAL AIRCRAFT EQUIPMENT

AEROLEX, LTD., Camberley, Surrey. **(No. 150.)**
Quick-release buckles, snap hooks, coupling sleeves, roller hooks, wire lashing gear and anchorage points.

AIR SERVICE TRAINING, LTD., Hamble, Hants. **(No. 20.)**
The A.S.T. water heater, aircraft lavatory, and automatic refrigerant food storage cabinet

FLIGHT REFUELLING, LTD., St. Nicholas, Littlehampton, Sussex. **(No. 8.)**
Special components and system for aircraft refuelling during flight.

GENERAL ELECTRIC CO., LTD., Kingsway, London, W.C.2. **(No. 118.)**
1-kW air-circulating oven for heating frozen foodstuffs; ½-gallon water heater; and the G.E.C. hot/cold tap.

G.Q. PARACHUTE CO., LTD., Stadium Works, Woking, Surrey. **(No. 28.)**
Various types of parachute and harness.

GODFREY, SIR GEORGE, & PARTNERS, LTD., Hampton Road, Hanworth, Middlesex. **(No. 71.)**
Aircraft cabin pressurized equipment including superchargers and air-conditioning equipment.

GREENWICH LEATHERCLOTH CO., LTD., Durex Wirks, St. Mary Cray, Kent.
A range of leather cloths suitable for aircraft seating and panelling purposes.

HAIRLOK CO., LTD., 117, Victoria Street, London, S.W.1. **(No. 62.)**
Rubberized hair in sheets or moulded shapes, and lightweight latex foam, for all types of cabin furnishings and upholstery.

IRVING AIRCHUTE OF GREAT BRITAIN, LTD., Letchworth, Herts. **(No. 85.)**
Parachutes of various types, including the Irvin chair chutes.

KING AIRCRAFT CORPORATION, 5th Street, Montrose Avenue, Hillington, Glasgow, S.W.2. **(No. 6.)**
Double aircraft passenger seat, weighing 31lb complete.

LATEX UPHOLSTERY, LTD., 41, Lonsdale Road, London, W.11. **(No. 151.)**
Light-weight aircraft passenger chairs, cushioning and shock absorbing padding.

PERMUTIT CO., LTD., Permutit House, Gunnersbury Avenue, London, W.4.
Drinking water filter units for aircraft.

R.F.D. CO., LTD., Catteshall Lane, Godalming, Surey. **(No. 110.)**
Aircraft dinghys, life-jackets and survival equipment of all types.

SCHERMULY PISTOL ROCKET APPARATUS, LTD., Spray Works, Park Gate, Newdigate, Surrey. **(No. 64.)**
Pyrotechnic apparatus, including parachute flares, distress signals, Verey cartridges, landing flares, rocket line-throwing apparatus and smoke-flame wind indicators.

SIEBE GORMAN & CO., LTD., Davis Road, Kingston By-Pass, Surbiton, Surrey. **(No. 49.)**
Oxygen supply equipment, including portable oxygen sets; and passenger safety belts with special quick-release clasps.

TURNER, ERNEST, LONDON, LTD., Northdown House, Northdown Street, King's Cross, N.1.
Light-weight seats, sleeping berths, upholstery, sound-proofing and roof lining, aircraft textiles, plastic and metal cabin fittings.

VICKERS-ARMSTRONGS, LTD., Vickers House, Broadway, Westminster, London, S.W.1. **(No. H.I.)**
Passenger seats in a variety of types; an extensive range of aircraft galley and toilet equipment and a silent-action ventilation louvre.

WINGHAM, BENNETT & CO., LTD., Central Works, Central Avenue, West Molesey, Surrey. **(No. 148.)**
A variety of designs of passenger seats in fixed and adjustable types.

FUELS, OILS and SPECIAL-PURPOSE FLUIDS

ACHESON COLLOIDS, LTD., 9, Gayfere Street, Westminster, S.W.1.
Colloidal graphite and dispersions of colloidal graphite in mineral oil, water, alcohol, white spirit, naphtha and other carriers.

ANGLO-AMERICAN OIL CO., LTD., Artillery House, Artillery Row, London, S.W.1.
Esso fuels and oils.

DICK, W. B., & CO., LTD., 25, Grosvenor Gardens, London, S.W.1.
Lubricating oils and greases, cutting oils, transformers, aero engines, switch-gear oils, and anti-rust compounds.

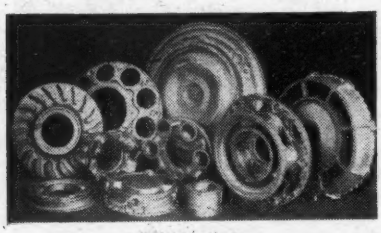
KILFROST MANUFACTURING CO., LTD., 1, St. Nicholas' Buildings, Newcastle-on-Tyne, 1.
De-icing fluids and pastes, hoar-frost remover for wings, tail and airscrew blade surfaces.

SHELL-MEX AND B.P., LTD., Shell-Mex House, Strand, London, W.C.2.
Fuels and lubricating oils for aviation purposes, and world-wide aviation service for these products.

STERNOL, LTD., Royal London House, Finsbury Square, London, E.C.2. **(No. 9.)**
"Sternocleanse" anti-dermatitis creams and process oils, and compounds for special purposes.

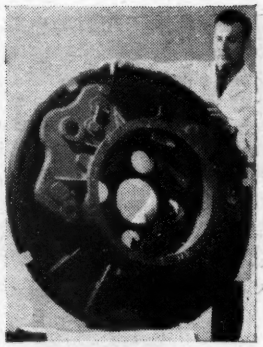
STREAMLINE FILTERS, LTD., Ingate Place, London, S.W.8.
Aircraft fuel and oil filtration equipment.

THE INDUSTRY . . . .



(Left) A selection of David Brown centrifugally cast components in heat-resisting alloys for gas turbines.

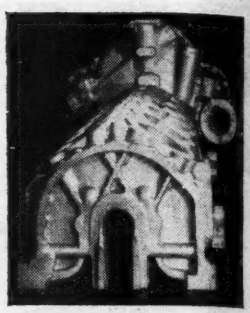
(Right) An accessory box and bulkhead cast in "Magnuminium" 220 by High Duty Alloys for Armstrong Siddeley Motors Ltd. The diameter is 45in. and the weight 135 lb.



AERONAUTICAL MATERIALS

ACCLES & POLLOCK, LTD., Oldbury, Birmingham. **(No. 13.)**
Machined and manipulated tubes in a variety of materials and types.
ACTON BOLT, LTD., 26, Chase Road, London, N.W.10. **(No. 97.)**
High tensile heat-treated bolts, nuts, steel pins and light alloy bolts; all to A.M. specifications.
AIRCRAFT MATERIALS, LTD., Midland Road, London, N.W.1. **(No. 115.)**
Fabric, tape, webbing and cordage, and ferrous and non-ferrous metals to B.S. and D.T.D. specifications.
BAKELITE, LTD., 18, Grosvenor Gardens, London, S.W.1.
Laminated plastic in sheets, rods and tubes; plastic moulding materials suitable for instrument housings, bezels, panels, control knobs, terminals and ignition accessories corrosion-resistant paints and varnishes, plastic resins and cements for joining plywood and interior panelling.
BIRKETT, T. M., & SONS, LTD., Hanley, Stoke-on-Trent.
Non-ferrous castings, machined components and bushes in phosphor bronze, gunmetal, manganese bronze, aluminium bronze and light alloys. Chill-cast rods and tubes.
BIRMETALS, LTD., Woodgate Works, Quinton, Birmingham, 32. **(No. 18.)**
Aluminium alloy strip, extruded sections, rods, bars, tubes and wire.
BOOTH, JAMES, & CO., LTD., Argyle Street, Nechells, Birmingham, 7. **(No. 90.)**
Duralumin sheet, strip, tubes, sections, extrusions, wire, rivets; similar products in magnesium alloys, brass, copper, cupro-nickel, phosphor bronze, aluminium brass, and beryllium bronze.
BOWDEN (ENGINEERS), LTD., Victoria Road, Willesden Junction, London, N.W.10.
Flexible wire cable controls, high pressure flexible pipes for hydraulic and other aircraft systems.
THE BRITISH ALUMINIUM CO., LTD., Salisbury House, London Wall, E.C.2. **(No. 155.)**
Light alloys in a wide variety of types, including rolled sheets, castings, forgings and extrusions.
BROWN BROTHERS (AIRCRAFT), LTD., Houghton Road, Northampton. **(No. 129.)**
Aircraft steels and alloy metals to B.S. and D.T.D. specifications.
BRUNTONS (MUSSELBURGH), LTD., Musselburgh, Scotland.
Cold-rolled steel strip to B.S. and D.T.D. specifications; steel rod and bar cast in a variety of sections; h.t. steel wire.
CONNOLLY BROTHERS (CURRIERS), LTD., Chalton Street, Euston Road, London, N.W.1. **(No. 120.)**
"Vaumol" and "Celestra" brand leather hides of light weight for aircraft finishing.
ENGLISH STEEL CORPORATION, LTD., Vickers Works, Sheffield.
Drop forgings from special steels.
FILTON, LTD., Clapham Terrace, Leamington Spa.
High-precision machining; glands and oil seals.
FIRTH VICKERS STAINLESS STEELS, LTD., Staybrite Works, Sheffield, 9. **(No. 48.)**
"Staybrite" stainless and heat-resisting aircraft steels in sheet, bars, strip and forgings, and in centrifugally cast and centri-die-cast forms for gas turbines.
FLATHER, W. T., LTD., Standard Steel Works, Sheffield. **(No. 80.)**
Bright-drawn, turned and ground carbon and alloy steel bars; nickel and nickel-chrome steels, and various steels for aircraft and engine components.
FLEXO PLYWOOD INDUSTRIES, LTD., Flexo Works, South Chingford, E.4.
Resin-bonded plywood to B.S. aircraft specifications; bulkheads, cabin doors, floor panels, etc., in wood, Onazote or Dufaylite core sandwiches with facings of plywood, duralumin, decorative timber or plastic.
FOX, SAMUEL, & CO., LTD., 17, Westbourne Road, Sheffield, 10. **(No. 70.)**
Alloy, stainless and heat-resisting steel, in ingots, billets, bars, slabs, sheet, strip and wire.
THE GENERAL ELECTRIC CO., LTD., Kingsway, London, W.C.2. **(No. 118.)**
G.E.C. heavy alloy.
GERRARD & CO., LTD., 37, Windermere Road, Muswell Hill, London, N.10.
"Roe's" laminated aluminium.
HABERSHON, J. J., & SONS, LTD., Holmes Mills, Rotherham. **(No. 126.)**
Steel strip, sheets, bars and sections.
HADFIELDS, LTD., East Hecla Works, Sheffield.
Heat-resisting steels for a wide variety of applications.
HALL & HALL, LTD., Oldfield Works, Hampton, Middlesex.
Aircraft jointing materials, synthetic rubber mouldings, sheetings and extrusions, copper and asbestos gaskets; wire-bound, non-rubber fuelling hoses; hydraulic packing and seals.
HALL & PICKLES, LTD., Port Street, Manchester, 1. **(No. 141.)**
High-temperature electrical-resistance materials, "Hydrex" stainless and heat-resisting steels.
HIGH DUTY ALLOYS, LTD., Buckingham Avenue, Trading Estate, Slough, Bucks. **(No. 21.)**
Castings, stampings, forgings and pressings in "Magnuminium" and "Hiduminium," light alloys, and aluminium-bronze and Nimonic materials for turbine blading.
HUGHES, F. A., & CO., LTD., Bath House, 82, Piccadilly, London, W.1. **(No. 102.)**
Elektron castings, elektron magnesium-zirconium alloy sheet, tube and bar sections and elektron forgings and welded structures.
THE HUGHES-JOHNSON STAMPINGS, LTD., Langley Green, Birmingham. **(No. 98.)**
Forgings in steels, aluminium alloys, copper, bronzes, high nickel-chrome alloys and yellow metals.
I.C.I., LTD., Leathercloth Division, Nobel House, 2, Buckingham Gate, London, S.W.1. **(No. 105.)**
"Vynide" brand polyvinyl chloride synthetic leathercloth, a light, flame-resistant fabric for interior decoration, made in many colours and designs and in qualities suitable for panelling or upholstery.
I.C.I., LTD., Metals Division, Nobel House, 2, Buckingham Gate, London, S.W.1. **(No. 106.)**
Aluminium alloy sheet, strip, tubes and extrusions, and pressings in non-ferrous metals.
I.C.I., LTD., Plastics Division, Nobel House, 2, Buckingham Gate, London, S.W.1. **(No. 107.)**
"Perspex" acrylic sheet, "Mouldrite" U.F. glaze, and "Welvic" polyvinyl chloride materials for aircraft construction; and "Alkathene" high-frequency components and low-weight containers.
JESSOP, WILLIAM & SONS, LTD., Brightside Works, Sheffield, 1. **(No. 60.)**
Special high-temperature steels for aircraft power units.
KAUTEX, LTD., Elstree Way, Elstree, Herts.
Products in cork, rubber and synthetic rubber.
E. & E. KAYE, LTD., Enfield, Middx.
Light-alloy sections, tubes and bars.
LATEX UPHOLSTERY, LTD., 41, Lonsdale Road, London, W.11. **(No. 151.)**
Light-weight upholstery; cushioning; Latex foam and rubberised hair, shock absorber padding, etc.
LUPTON & PLACE, LTD., Trafalgar Street, Burnley.
Phospor bronze and gun-metal castings of all kinds and aluminium alloy gravity die castings.
MAGNESIUM ELEKTRON, LTD., Abbey House, Baker Street, London, N.W.1. **(No. 101.)**
Magnesium and magnesium alloy ingots, billets and slabs.
METROPOLITAN PLYWOOD CO., 18-30, Leonard Street, London, E.C.2. **(No. 41.)**
"Emcore" aircraft plywood, to all aircraft specifications, metal-faced plywood, composite boards in various combinations of plywood, Balsa wood, expanded rubber, cork and sheet metals, etc., moulded plywood in simple and compound curves, wound plywood tubes and low-pressure mouldings in laminated fabrics.
THE MOND NICKEL CO., LTD., Grosvenor House, Park Lane, London, W.1. **(No. 27.)**
A range of nickel steel alloys, particularly the Nimonic series for use in gas turbine construction.
NORTHERN ALUMINIUM CO., LTD., Banbury, Oxon. **(No. 82.)**
Aluminium alloys in sheet, extrusions, castings and forgings.
RENFREW FOUNDRIES, LTD., Hillington, Glasgow. **(No. 15.)**
Sand- and die-cast aluminium alloys.
REYNOLDS, LTD., Birmingham. **(No. 125.)**
Light alloy tubes, extrusions, sheet and strip.

Turn and slip indicator produced by R. B. Pullin and Co., Ltd.



A typical crankcase casting by Birmid Industries Ltd.

SMITH'S STAMPING WORKS (COVENTRY), LTD., Ribble Road, Coventry. **(No. 54.)**
Drop forgings, press forgings, upset forgings of all types, in steel and light alloy.
SOUTHERN FORGE, LTD., Langley, Bucks. **(No. 14.)**
Aluminium alloys, particularly in intricate extruded sections.
STERLING METALS, LTD., Coventry. **(No. 84.)**
Sand and gravity die-castings in magnesium "Elektron" alloys and aluminium alloys.
TRUCAST, LTD., 55, Pall Mall, London, S.W.1. **(No. 30.)**
Precision casting of turbine and compressor blades, development and prototype specialists.
TUFNOL, LTD., Perry Barr, Birmingham, 22B. **(No. 92.)**
Tufnol laminated, synthetic, resin-bonded material in sheets, tubes and rods, together with a diverse range of specially moulded shapes.
TUNGUM SALES CO., LTD., Brandon House, Painswick Road, Cheltenham, Glos. **(No. 32.)**
Tungum alloy and Tungum alloy tubes in a variety of sizes.
A. H. VANE & CO., Empire House, St. Martin's-le-Grand, London, E.C.1. **(No. 4.)**
Wide range of textile fabrics, serrated tapes and threads, and a new light-weight leathercloth for cabin linings and upholstery
WELLWORTHY PISTON RINGS, LTD., Lymington, Hants. **(No. 29.)**
Small castings in iron and aluminium alloys.
WIGGIN, HENRY, & CO., LTD., Wiggin Street, Birmingham, 16.
High nickel alloys in all forms for use at elevated temperatures with resistance to corrosion; Monel, pure nickel, Inconel, and Nimonic alloys and electrical resistance materials.
WILKINSON RUBBER LINATEX, LTD., St. Mary's Works, Frimley Road, Camberley, Surrey.
Sealing material for doors and windows, etc., particularly for aircraft having pressurised cabins; a variety of Linatex components for aircraft including gaskets for inspection doors.
YORKSHIRE ENG. SUPPLIES, LTD., Wortley, Leeds, 12.
Phosphor-bronze bushes and cast bars.

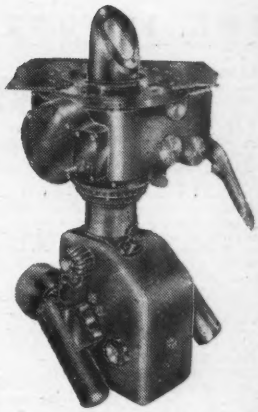
Used for measuring the pressure difference between compressors and burners of gas turbine engines, this gauge is made by K.D.G. Instruments Ltd.

THE INDUSTRY . . . . .

INSTRUMENTATION and SPECIALIZED SERVICES

ACCURATE RECORDING INSTRUMENT CO., Aric Works, Garth Road, Lower Morden, Surrey.
Remote-reading dial type thermometers, pressure gauges and compound and vacuum gauges.
BRITISH ROTOTHERM CO., LTD., Merton Abbey, S.W.19.
Aircraft radiator, air, oil and cabin thermometers and temperature change indicators and controllers.
ENGLISH ELECTRIC CO., LTD., Queen's House, Kingsway, London, W.C.2. **(No. 161.)**
A portable ignition tester, enabling the electrical performance of the entire ignition circuit to be checked on the ground or in flight.
HUGHES, HENRY, & SON, LTD., Husun Works, New North Road, Barkingside, Essex. **(No. 1.)**
Aircraft flight and navigational instruments, including various types of gyro-magnetic compasses and the Hughes Periscopic sextant.
K.D.G. INSTRUMENTS, LTD., Purley Way, Croydon.
Sensitive differential pressure gauges for use with gas turbines and other aircraft instruments.
KELVIN BOTTOMLEY & BAIRD, LTD., Kelvin Works, Basingstoke, Hants. **(No. 33.)**
Engine synchroscopes, speed indicators, helicopter tachometers, pressure gauges, air-speed and rate of climb indicators, accelerometers and all types of instruments.

KENT, GEORGE, LTD., Luton, Beds.
Aircraft fuel meters with electrically operated bye-pass valve.
MUNRO, R. W., LTD., Cline Road, Bounds Green, London, N.11.
Munro electrical equipment, comprising wind speed and direction indicators, recorders, anemometers, air-speed indicators and pitot heads. Speed recording instruments for helicopters, and machmeters.
POWER FLEXIBLE TUBING CO., LTD., Derby Works, Finsbury Park, N.4.
Flexible metallic bellows in Tombac and stainless steel.
PULLIN, R. B., & C., LTD., Phœnix Works, Gt. West Road, Brentford, Middx.
Special purpose instruments, including gyroscopic turn and slip indicators, minature motors for aircraft and instrument purposes.
SALFORD ELECTRICAL INSTRUMENTS, LTD., Peel Works, Salford, 3, Lancs. **(No. 59.)**
The G.E.C. radio compass, and the radio sonde for the measurement of upper air meteorological conditions.
SANGAMO WESTON, LTD., Great Cambridge Road, Enfield, Middx. **(No. 140.)**
Ranges of instruments for aircraft installation, including voltmeters, ammeters, engine- air- and radiator-temperature indicators, and various combinations of moving coil and ratiometer designs for blind approach, distance and orbit indication.
SHORT & MASON, LTD., Aneroid Works, Hale End Road, Walthamstow, London, E.17. **(No. 75.)**
Military and civil pattern aircraft instruments; recording altimeters; barographs; electric remote indicating wind speed and direction indicators and other meteorological and automatic control instruments.
SIEBE GORMAN & CO., LTD., Davis Road, Tolworth, Surrey. **(No. 49.)**
Oxygen regulators, economisers and flow indicators, and portable oxygen sets; altimeter calibrators.
SIMMONDS AEROCESSORIES, LTD., Treforest, Glam. **(No. 121.)**
The Pacitor electronic fuel-contents gauge and measuring system.
SMITHS AIRCRAFT INSTRUMENTS, LTD., Cricklewood Works, London, N.W.2. **(No. 2.)**
Artificial horizons, directional gyro, air-speed indicators, pressure gauges, Waymouth fuel contents gauges.
SPERRY GYROSCOPE CO., LTD., Great West Road, Brentford, Middx. **(No. 25.)**
The Gyrosyn compass; the Sperry Comverter; the Sperry Pilot Aid; and a range of aircraft primary flight instruments.
VINTEN, W., LTD., North Circular Road, London, N.W.2. **(No. 111.)**

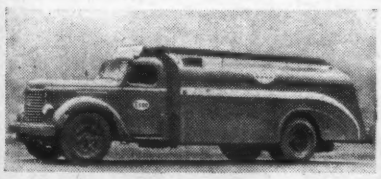


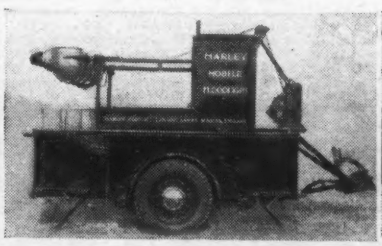
Periscopic sextant by Henry Hughes and Sons Ltd.

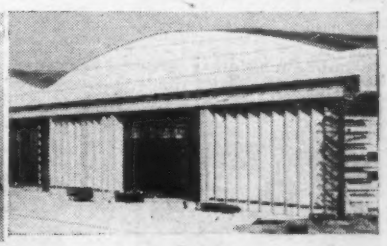
High-speed cine cameras, timing equipment and instrumentation cameras, 35 and 70mm.
WILLIAMSON MANUFACTURING CO., LTD., Litchfield Gardens, Willesden Green, London, N.W.10. **(No. 130.)**
The S.P. 3 projector for Williamson-Ross mapping equipment; the Williamson servo sight; the Type O.S.C. Mk. II photogrammetric air survey camera; the Kinetric camera shutter, and the F 83 survey camera.

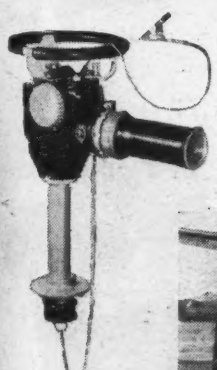
AIRPORT EQUIPMENT and SERVICES

ANGLO-AMERICAN OIL CO., LTD., Artillery House, Artillery Row, London, S.W.1.
Mobile refueller vehicles of 4,000-gallon capacity with dual delivery systems, each capable of dispensing 85 gall/min. with 100 ft of hose.
BARNARDS, LTD., Norfolk Iron Works, Norwich.
Passenger landing steps; passenger transpor vehicles; baggage trailers; refuelling ladders; and maintenance rostra.
BRITISH FILTERS, LTD., Old Court, Cox Green, Maidenhead.
A wide range of filtration apparatus for aircraft refuelling.
BROWN BROTHERS (AIRCRAFT), LTD., Houghton Road, Northampton. **(No. 129.)**
Hydraulic and screw-type jacks; maintenance platforms and steps; cabin entry steps; engine stands; work benches; vacuum cleaners; wheel and jack transporters and electric trucks.
DAVID BROWN TRACTORS, LTD., Melham, near Huddersfield.
"Taskmaster" short-haul tractor and "Heavy Industrial" tractor for aircraft towing, and luggage and freight movement.
CHANCE BROTHERS, LTD., Lighthouse Works, Smethwick, 40, Birmingham.
Airport location beacons, lanterns and optical signalling equipment, lenses and polished glass.
COLE, E.K., LTD., Ekco Works, Southend-on-Sea, Essex. **(No. 99.)**
Light aircraft communication equipment and aerodrome communication installations, ignition and electrical suppression components.
COSSOR RADAR, LTD., Cossor House, Highbury Grove, London, N.5. **(No. 19.)**
H.F. general purpose transmitter, Gee Ground Station and airborne communications equipment and track guides.
COVENTRY CLIMAX ENGINES, LTD., Widdrington Road Works, Coventry.
Fork lift trucks for mechanical material handling.
DECCA NAVIGATOR CO., LTD., 1-3, Brixton Road, oLndon, S.W.9. **(No. 43.)**
Decca Navigator receivers, flight plotters, Lane identification equipment.
R. K. DUNDAS, LTD., The Airport, Portsmouth.
Equipment for airports including hoists, signalling lamps and maintenance platforms.
DUNLOP & RANKEN, LTD., 147, The Headrow, Leeds, 1.
Fabricated steelwork of all kinds. Mild steel bars, sections, hoops, sheets and plates.

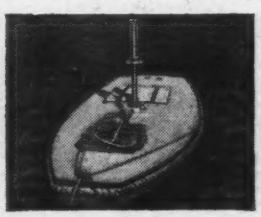








(Top row, left to right) : An Anglo-American Oil Co. mobile refueller of 1,500-gal. capacity. A mobile floodlight trailer unit built by Harley Ltd. Brabazon I hangar at Filton using Esavian folding and sliding doors. (Bottom row) : For aircraft refuelling the Tecalemit automatic safety nozzle shuts off the flow at a predetermined level. Leyland's latest type of aircraft refuelling tanker. Dinghy mounted with Londex fluorescent battery-operated landing light for marine aircraft guidance. The I.T.D. Ltd., Stacatruc fork lift truck for mechanical handling and aircraft loading.



THE INDUSTRY . . . .

ESAVIAN, LTD., Esavian Works, Stevenage, Herts. **(No. 65.)**
Folding and sliding doors, windows and partitions.
EXACTOR CONTROL CO., LTD., 108, Park Street, London, W.1.
Exactor fuel system test rig.
FIELD AIRCRAFT SERVICES, LTD., Croydon Airport, Surrey. **(No. 74.)**
Complete servicing facilities for aircraft, engines and airscrews, at Croydon, Nottingham, Bovingdon and Lympne. "One-Day" spares service; overhauls and conversions; operation service; aircraft sales; radio, instruments and auxiliaries repair. Collection and transport of damaged aircraft; consultation, survey and certification. Airport equipment: passenger steps, baggage trolleys and platforms.
FLIGHT REFUELLING, LTD., St. Nicholas, Littlehampton, Sussex. **(No. 8.)**
A highly developed system for the refuelling of aircraft during flight.
GENERAL ELECTRIC CO., LTD., Kingsway, London, W.C.2. **(No. 118.)**
Airport lights of high and low-intensity; location and course-marking beacons; runway contact lamps; signalling lamps and projector lamps.
HARLEY AIRCRAFT LANDING LAMPS, Paxton Hill, St. Neots, Hunts. **(No. 36.)**
Portable mobile floodlight units for emergency and beacon application.
HYMATIC ENGINEERING CO., LTD., Redditch, Worcs. **(No. 119.)**
Mobile compressor set for aircraft and airport maintenance, and compressor set for ground-charging aircraft pneumatic systems.
I.T.D., LTD., Staceatruc House, 142, Sloane Street Square, London, S.W.1.
Fork lift trucks for mechanical loading of aircraft.
LAING, JOHN, & SON, LTD., London, N.W.7.
Building and Engineering Contractors, airfield and runway contractors.
LEP TRANSPORT, LTD., Sunlight Wharf, Upper Thames Street, E.C.4. **(No. 134.)**
Packaging and transport of aircraft and components for distribution all over the world.
LEYLAND MOTORS, LTD., Leyland, Lancashire.
Leyland aircraft refuelling tankers.
MINISTRY OF CIVIL AVIATION, Ariel House, Strand, W.C.2. **(No. 93.)**
V.H.F. area coverage and cathode ray D/F equipment, V.H.F. ground station and aircraft equipment.
MUNRO, R. W., LTD., Cline Road, Bounds Green, London, N.11.
Munro electrical equipment, comprising wind, speed and direction indicators, recorders, anemometers, air-speed indicators and pitot heads. Speed recording instruments for helicopters, and machmeters.
MURPHY RADIO, LTD., Welwyn Garden City, Herts. **(No. 135.)**
Single-channel crystal-controlled HF ground station telephony receiver, and VHF crystal-controlled ground station transmitter.
PARK, R. & J., LTD., Dominion House, Thames Road, Chiswick, W.4. **(No. 45.)**
Packing cases for aircraft, aircraft components and equipment. Specialists in shipping and packing.
PETO & RADFORD, 50, Grosvenor Gardens, London, S.W.1. **(No. 145.)**
Ground starter trolleys and ground starter batteries.
P Y E TELECOMMUNICATIONS, LTD., Ditton Works, Newmarket Road, Cambridge.
Radio and telephone transmitters and receivers and radio communication equipment and components.
PYRENE CO., LTD., 9, Grosvenor Gardens, London, S.W.1. **(No. 132.)**
Fire-fighting equipment of various types, including airfield crash tenders with mechanical foam generators and CO, gas equipment.
RANSOMES, SIMS & JEFFERIES, LTD., Ipswich.
Gang mowing machines for airfields.
REDIFFUSION, LTD., Broomhill Road, Wandsworth. **(No. 137.)**
Range of telegraphy and telephony radio communication equipment for airport control, navigational and communication services.
SALFORD ELECTRICAL INSTRUMENTS, LTD., Peel Works, Salford, 3, Lancs. **(No. 59.)**
A tape recorder for the recording and reproduction of verbal messages or for the reproduction of musical programmes.
SCHERMULY PISTOL ROCKET APPARATUS, LTD., Spray Works, Park Gate, Newdigate, Surrey. **(No. 64.)**
Pyrotechnic apparatus, including parachute flares, distress signals, Very cartridges, landing flares, rocket line-throwing apparatus and smoke-flame wind indicators.
SHELL-MEX & B.P., LTD., Shell-Mex House, Strand, London, W.C.2.
Fuels and lubricating oils for aviation purposes and world-wide aviation service for these products.
SKYHI, LTD., Skyhi Works, Worton Road, Isleworth, Middx. **(No. 78.)**
Hydraulic aircraft-servicing jacks of bipod, tripod, and quadrupod types, and aircraft wheel-changing jacks; "Skyflex" high-pressure flexible hose units and "Skyhi" inhibitor spray guns.
STANDARD TELEPHONES & CABLES, LTD., Connaught House, Aldwych, W.C.2. **(No. 133.)**
Radio communication equipment and radio navigation and blind-landing aids.
STEEL'S ENGINEERING PRODUCTS, LTD., 6, Avonmore Road, Fulham, W.14.
"Electric Eel" industrial trucks, including 30-cwt "Load Carrier" fixed platform model, 50-cwt elevating platform model, 40-cwt tiering model, and heavy duty tractor.
TECALEMIT, LTD., Great West Road, Brentford, Middx. **(No. 47.)**
Tecalemeters; refuelling nozzles; automatic air compressors; high-pressure drum pump; hand-guns and nipples.
TRIPLEX SAFETY GLASS CO., LTD., Triplex Works, Hythe Road, N.W.10. **(No. 46.)**
Runway lights and colour filters.
ZWICKY, LTD., Bedford Avenue, Trading Estate, Slough, Bucks.
Aircraft refuelling vehicles and equipment.

ELECTRICAL, ELECTRONIC, RADIO and RADAR EQUIPMENT

AIRMEC LABORATORIES, LTD., 19, Charterhouse St, E.C.1. **(No. 156.)**
Amplifiers, frequency meters, voltage testers, H.F. and L.F. signal generators, electronic heat generators, process timers and oscilloscopes.
BRITISH INSULATED CALLENDER'S CABLES, LTD., 21, Bloomsbury Street, London, W.C.1. **(No. 50.)**
"Pren" and "Prenmet" electric cables of light weight and with high flame resistance, in various types and ratings for service up to 250 V and 400 c/s.
BRITISH THOMPSON HOUSTON CO., LTD., Rugby. **(No. 52.)**
All types of electrical equipment for aircraft, including actuators, booster coils, A.C. and D.C. motors, switches, circuit-breaking devices, Mazda lamps and lighting equipment, and a new three-unit motor generator set for airborne radar power supply.
CHLORIDE ELECTRICAL STORAGE CO., LTD., Exide Works, Clifton Junction, nr. Manchester. **(No. 116.)**
Exide and Drydex batteries in a wide range of capacities and, particularly, the new Exide 24-V aircraft battery, featuring plastic construction and low weight.
COSSOR RADAR, LTD., Cossor House, Highbury Grove, London, N.5. **(No. 19.)**
H.F. general purpose transmitter, GEE Ground Station and airborne communications equipment and track guides.
DECCA NAVIGATOR CO., LTD., 1-3, Brixton Road, London, S.W.9. **(No. 43.)**
Decca Navigator receivers, flight plotters, lane identification equipment.
DELCO-REMY-HYATT (DIVISION OF GENERAL MOTORS), LTD., 111, Grosvenor Road, London, S.W.1. **(No. 160.)**
Electric motors and controllers, including high-cycle alternator motors and the split-field type for electronic applications.
FERRANTI, LTD., Hollinwood, Lancs. **(No. 100.)**
A miniature airborne receiver unit designed for use with the Consol navigation system, but also suitable for MF radio ranges; and a range of miniature hermetically sealed mains- and audio-transformers and chokes.
GENERAL ELECTRIC CO., LTD., Kingsway, London, W.C.2. **(No. 118.)**
VHF single-channel radio transceiver; aircraft wiring cables; switchboards; generators; transformers and other electrical equipment for aircraft.
HELLERMANN ELECTRIC, LTD., Tinsley Lane, Crawley, Sussex.
Aircraft cable, binding, insulating and sleeving apparatus.
LONDEX, LTD., Anerley Works, 207, Anerley Road, London, S.E.20.
Electrical remote control devices and fluorescent battery operated landing lights for seaplanes.
MARCONI'S WIRELESS TELEGRAPH CO., LTD., Marconi House, Chelmsford, Essex. **(No. 7.)**
Aircraft radio communication equipment and beam approach and direction-finding equipment.
MURPHY RADIO, LTD., Welwyn Garden City, Herts. **(No. 135.)**
Single-channel V.H.F. transmitter/receiver for light aircraft; 5-channel low-power V.H.F. transmitter/receiver for light and medium aircraft; and MF/DF loop receiver, including left/right indicator.
NEWTON BROTHERS (DERBY), LTD., Alfreton Road, Derby. **(No. 73.)**
Engine- and wind-driven A.C. and D.C. generators; special lightweight rotary transformers and convertors; the Newton-Derby automatic carbon pile voltage and current regulators.
PETO & RADFORD, LTD., 50, Grosvenor Gardens, London, S.W.1. **(No. 145.)**
"Dagenite" accumulators for aircraft.
PLESSEY CO., LTD., Ilford, Essex. **(No. 76.)**
A 5-channel lightweight VHF transmitter/receiver for light aircraft, and a lightweight MF/HF receiver for simple D/F facilities combined with an HF transmitter.
PYE, LTD., Radio Works, Cambridge.

(Top row, left to right) Redifon R.50 communications receiver manufactured by Rediffusion Ltd. Evershed and Vignoles produce this electronic gas turbine speed controller comprising control unit, signal tachometer, amplifier unit and fuel valve motor. Airmec electronic process timer. A 24-volt aircraft battery exhibited by Chloride Electrical Storage Co., Ltd. (Bottom row): The Decca route graph for the Metropolitan Control Zone is incorporated in this Decca flight plotter. A Rotax 29-V., 6-K.W. generator Newton Derby carbon pile voltage and current regulator containing battery cutout and fuse box: shown with cover removed.

THE INDUSTRY . . . . .

Ranges of universal switches, relays and multiway back-mounting plugs and sockets.

REDIFFUSION, LTD., Broomhill Road, Wandsworth. **(No. 137.)**

Range of telegraphy and telepony radio communication equipment for airport control, navigational and communication services.

ROTAX, LTD., Willesden Junction, London, N.W.10. **(No. 86.)**

Aircraft batteries, switch gear, motors, convertors, alternators and wiring systems.

RUNBAKEN ELECTRICAL PRODUCTS, 71-73A, Oxford Road, Manchester, 1.

Electrical transformers, rectifiers, instruments and other products.

SALFORD ELECTRICAL INSTRUMENTS, LTD., Peel Works, Salford, 3, Lancs. **(No. 59.)**

Quartz crystal units for all frequencies between 4 kc/sec and 15 Mc/sec.

SAVAGE & PARSONS, LTD., Watford, Herts. **(No. 139.)**

Strain gauge recorders; high-speed, 7-channel galvanometer camera; high-speed photoflash equipment; resonance testing equipment; multi-range bridges; helical potentiometers; 50-way multi-point switches; 2-ohm precision slide wire; moving-coil galvanometers.

SMITHS AIRCRAFT INSTRUMENTS, LTD., Cricklewood Works, London, N.W.2. **(No. 2.)**

Artificial horizons, directional gyro, airspeed indicators, pressure gauges, Waymouth fuel contents gauges, electric automatic pilot.

(Left) : G.E.C. airfield signal projector lamp.
(Right) : Single channel V.H.F transmitter receiver (weight 16½ lb.) made by Murphy Radio Ltd.

STANDARD TELEPHONES & CABLES, LTD., Connaught House, Aldwych, London, W.C.2. **(No. 133.)**

MF. HF and VHF radio communication equipment.

ULTRA ELECTRIC, LTD., Western Avenue, Acton, W.3. **(No. 39.)**

Inter-communication control equipment.

PAINTS, SEALANTS and FINISHES

AERO RESEARCH, LTD., Duxford, Cambridge.

Range of synthetic resin adhesives for bonding wood, metal and other materials.

B. B. CHEMICAL CO., LTD., Ulverscroft Road, Leicester.

Range of Bostik sealants, adhesives and glazing compounds.

BERGER, LEWIS & SONS, LTD., 35, Berkeley Square, W.1. **(No. 88.)**

Solventless varnish and finishes for aircraft and industrial purposes.

CELLON, LTD., Kingston-on-Thames, Surrey. **(No. 91.)**

"Cellon" dopes; "Cerric" lacquers; and "Cerrux" synthetic finishes, and the new "Birlon" temporary protective coating for polished metal surfaces.

DOCKER BROTHERS, 177, Corporation Street, Birmingham, 4. **(No. 67.)**

Aircraft finishes, paints, varnishes and lacquers and cellulose, synthetic and stoving materials.

HALL, JOHN, & SONS (BRISTOL AND LONDON), LTD., 4, Cadogan Road, Hengrove, Knowle, Bristol, 4. **(No. 81.)**

Paints and finishes of a variety of types.

I.C.I., LTD., PAINTS DIVISION, Nobel House, 2, Buckingham Gate, London, S.W.1. **(No. 104.)**

The "Alocrom" process for the pre-treatment of aluminium and its alloys, giving a thin, adhesive and smooth coating that protects metal from corrosion and provides a key for paint; a wide range of aircraft finishes, including "Pyrovel" non-inflammable dopes and examples of one-coat exterior finishes.

JENSON & NICHOLSON, LTD., Jenson House, Carpenter's Road, London, E.15. **(No. 72.)**

"Airborne" dopes, lacquers, enamels, varnishes and paints, and "Tee Vee" sealant for closing minute defects in castings and fixing any loose particles of foundry sand.

PAINT REMOVERS, LTD., 24, Ryder Street, St. James's, London, S.W.1.

"Offkwick" stripper for varnish, paint, cellulose and other aircraft finishes.

QUICKSTRYP CHEMICAL CO., LTD., 57, Kingsland High Street, London, E.8.

Paint stripping composition for all types of finishes.

RYLAND, LLEWELLYN, LTD., Balsall Heath Works, Birmingham, 12. **(No. 128.)**

Protective and decorative coatings, cellulose dopes and lacquers, oil primers and synthetic finishes, seaplane varnish, jointing compounds, stoving enamels and paint removers.

SURRIDGE'S PATENTS, LTD., Croydon Road, Elmers End, Beckenham, Kent.

"Holdtite" industrial adhesives, including the new "Bondtite" A, based on one of the new synthetic rubbers.

TITANINE, LTD., Colindale, London, N.W.9. **(No. 127.)**

Aircraft dopes, cellulose and synthetic lacquers, finishes and polishes.

WELLWORTHY PISTON RINGS, LTD., Lymington, Hants. **(No. 29.)**

"Wellseal" patent jointing compound for metal-to-metal joints.

MACHINE TOOLS, RESEARCH and WORKSHOP EQUIPMENT

THE AEROGRAPH CO., LTD., Lower Sydenham, London, S.E.26.

Spray-painting equipment.

AIRCRAFT MATERIALS, LTD., Midland Road, London, N.W.1. **(No. 115.)**

"Pop" rivets and riveting tools, for hand, pneumatic and hydraulic operation. Range of hand and machine sets and spinning tools for setting tubular, cup and solid rivets and eyelets.

AIR INDUSTRIAL DEVELOPMENTS, LTD., Shenstone, near Litchfield, Staffs.

Air compressors; storage chambers; pneumatic motors; spray guns; pressure-feed paint containers; oil and water extractors.

AIRSCREW CO., LTD., Weybridge, Surrey.

Fan-type air brakes for engine endurance testing; wind tunnels and smoke tunnels.

AMAL, LTD., Holford Works, Perry Barr, Birmingham, 20. **(No. 103.)**

Fuel feed calibrating machines and flowmeters.

JAMES ARCHDALE & CO., LTD., Ledsam Street, Birmingham, 6.

A variety of machine tools and workshop equipment.

AVIATION DEVELOPMENTS, LTD., Kingsbourne House, 229, 231, High Holborn, London, W.C.1. **(No. 34.)**

Chobert riveting guns and rivets.

BIFURCATED & TUBULAR RIVET CO., LTD., Aylesbury, Bucks. **(No. 143.)**

Hand-feed patent flush-rivet setting-machines, and a magazine-feed for attachment to a Consolidated pneumatic rivet gun.

BLACK & DECKER, LTD., Harmondsworth, Middx.

Electrically powered workshop and hand tools, and aircraft maintenance equipment.

BRITISH OXYGEN CO., LTD., Grosvenor House (Sixth Floor), Park Lane, W.1.

Argon arc welding equipment, pressure regulators, flowmeters, gas and power cables and welding rods.

BRITISH RAWHIDE BELTING CO., LTD., 246-8, Great Portland Street, W.1.

Gears, belting, band saws and sanders.

BROOKE TOOL MFG. CO., LTD., Warwick Road, Greet, Birmingham, 11.

Engineers small tools, drill chucks, gear cutters, facing heads, vices.

BROOM & WADE, LTD., High Wycombe, Bucks.

"Broomwade" range of pneumatic power tools.

BROWN, DAVID, & SONS (HUDDERSFIELD), LTD., Park Gear Works, Huddersfield. **(No. 131.)**

Special reamers, tungsten-tipped tools, profile hobs and other gear-cutting tools.

BRYANS AEROQUIPMENT, LTD., Willow Lane, Mitcham, Surrey. **(No. 162.)**

Test tables for air-driven and electrically driven gyro instruments; thermometer-tester for all bridge-type resistance thermometers; photometric comparators; universal manometers; various types of pressure gauge testing equipment and portable pressure chambers for barometric instrument testing.

CANNING, W., & CO. LTD., Great Hampton Street, Birmingham, 18.

Electro-plating and metal finishing plant.

CHURCHILL MACHINE TOOL CO., LTD., Broadheath, Nr. Manchester.

Wide range of all types of grinding machines including centreless and universal grinding machines.

DESOUTTER BROTHERS, LTD., The Hyde, Hendon, London, N.W.9. **(No. 51.)**

Electric and pneumatic portable power tools.

ENGLISH ELECTRIC CO., LTD., Queen's House, Kingsway, London, W.C.2. **(No. 161.)**

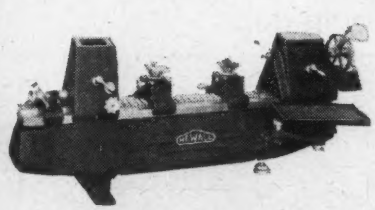
Wind tunnel drives and ancillary parts, including dynamometers for testing piston engines, gas turbines and their auxiliaries.

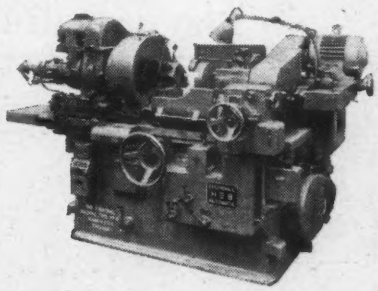
ENGLISH STEEL CORPORATION, LTD., Vickers Works, Sheffield. **(No. 10.)**

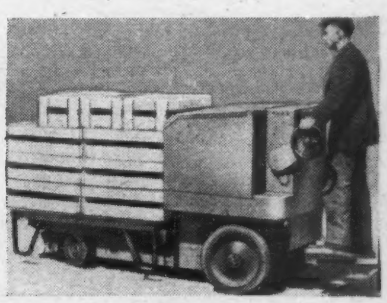
Engineers small tools including adjustable and expanding reamers and inserted blade milling cutters.

FAIREY AVIATION CO., LTD., Hayes, Middx. **(Stand E.)**

Precision tube sizers, recessing tools, clamps and fasteners.







(Above) : This Newall measuring machine gives direct readings to .00001in.
(Centre) : A new model of the Churchill automatic sizing internal grinding machine.
(Right) : Steels Engineering Products Ltd. are the makers of this 50-cwt. low lift industrial truck.

THE INDUSTRY . . . . .

THOMAS FIRTH & JOHN BROWN, LTD., Atlas and Norfolk Works, Sheffield, 1. **(No. 112.)**
Hardometer hardness - testing machines; drills; reamers; cutters; files; hacksaws; ground - thread taps; three-in-one milling cutters and precision tools.

GILMAN, F. (B.S.T.), LTD., 195, High Street, Smethwick, 41, Staffs. **(No. 44.)**
"Moldflex" portable machines of flexible drive type for grinding, polishing, sanding, wire-brushing, etc., and the "Titegrip" range of rotary milling cutters and files.

HALL & PICKLES, LTD., Port Street, Manchester, 1. **(No. 141.)**
"Hydra" tools, tipped with "Hydraloy" hard metal.

HILL, C. & L., LTD., Stringes Lane Willenhall, Staffs.
Zinc base alloy tools for use on presses, stamps and drop hammers; antimonal lead punches.

HYMATIC ENGINEERING CO., LTD., Redditch, Worcs. **(No. 119.)**
Pneumatic hammers, spray guns and blow guns.

JENKS BROTHERS, LTD., Britool Works, Bushbury, Wolverhampton.
"Britool" socket, ring and jaw wrenches of a wide variety of types.

JESSOP, WILLIAM, & SONS, LTD., Brightside Works, Sheffield, 1. **(No. 60.)**
Supersonic flaw-detector and short-term creep testing units for routine production control.

SAMUEL JONES & CO., LTD., 16-17, New Bridge Street, London, E.C.4.
Self adhesive tape in cloth and paper conforming to M.O.S. and A.I.D. requirements.

LACY-HULBERT & CO., LTD., Boreas Wks., Beddington, Croydon, Surrey.
Mobile high pressure pneumatic aircraft testing rigs, including compressors up to 1,200lb per square inch, vacuum pumps and receivers.

LEYTONSTONE JIG & TOOL CO., LTD., Leytool Works, High Road, Leyton, London, E.10.
"Leytool" precision press tools, jigs, fixtures, moulds, gauges, hand tools, special machine tools, etc.

LODGE PLUGS, LTD., Rugby. **(No. 12.)**
Specialized sparking plug servicing and testing equipment.

THE MALLOCK-ARMSTRONG CO., 39, Victoria Street, London, S.W.1.
"Nosonic" ear defenders for engine test-bed personnel.

MARLEY, W. H., & CO., LTD., New Southgate Works, 105, High Road, London, N.11.
"Marico" tools, fixtures and attachments for machine shop and toolroom use.

METALLISATION, LTD., Barclays Bank Chambers, Dudley.
Metal spraying equipment particularly for aluminium coating of aircraft parts and aluminising of aircraft exhaust systems.

MOLLART ENGINEERING CO., LTD., Kingston By-Pass, Surbiton, Surrey. **(No. 138.)**
Jigs, tools, gauges and special machines.

MORRIS, B. O., LTD., Morrisflex Works, Clay Lane Coventry.
Flexible shafts and flexible shaft machines, polishing machines and accessories, rotary files and cutters, mounted points, wire and fabric brushes and sanding machines.

NEWALL ENGINEERING CO., LTD., Peterborough.
Machine tools, grinders of various types and optical precision measuring apparatus.

PARKINSON, J., & SON, Shipley, Yorks.
Machine tools including universal and plain milling machines, gear planers and testers, cutter sharpening machines.

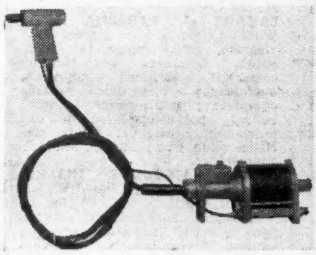
PITTER GAUGE & PRECISION TOOL CO., LTD., Market Street, Woolwich, S.E.18.
Precision slip gauges, micrometers, comparators and other measuring instruments.

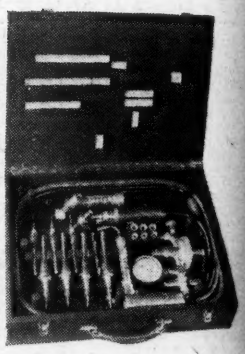
POWER FLEXIBLE TUBING, CO., LTD., Derby Works, Finsbury Park, N.4.
All-metallic hose for steam presses, steel ventilating hose, and flexible shaft outer casings, flexible metallic inner linings for petrol delivery hose.

PULTRA, LTD., 24, Gravel Lane, Salford, 3, Manchester.

(Right) "Argonarc" welding set produced by the British Oxygen Co.

(Below) A hydraulic "pop" riveting gun and intensifier produced by Aircraft Materials Ltd.





Workshop and toolroom lathes, including micro-lathes and watch lathes in various sizes.

PUMP UNIT, LTD., 25, Coptic Street, W.C.1.
Self-contained hydraulic pump units, complete with reservoir, electric motors, pressure regulator valves incorporating one or two stage low and high pressure hydraulic pumps.

RICHARDS, GEORGE, & CO., LTD., Broadheath, Nr. Manchester.
Machine tools including vertical and horizontal boring; crankpin and turning machines, slot drilling and keyway cutting machines; horizontal milling, drilling, facing and tapping machines.

SANGAMO WESTON, LTD., Great Cambridge Road, Enfield, Middx. **(No. 140.)**
Portable testers, analyzers, and a range of sub-standard and standard testing instruments, including photographic exposure meters and photometers.

STONEHOUSE STEEL EQUIPMENTS, LTD., Stonehouse Works, Houghton Street, West Bromwich.
Sheet-steel fabricated benches and containers.

TAYLOR, TAYLOR & HOBSON, LTD., Stoughton Street, Leicester.
Machine tools, measuring instruments and photographic lenses.

THE SHEFFIELD TWIST DRILL & STEEL CO., LTD. Summerfield Street, Sheffield.
Drills of all types including stub drills of reduced length for aircraft work.

TUFNOL, LTD., Perry Barr, Birmingham, 22B. **(No. 92.)**
Jigs, pulleys, gear wheels and bearings, etc., for industrial applications.

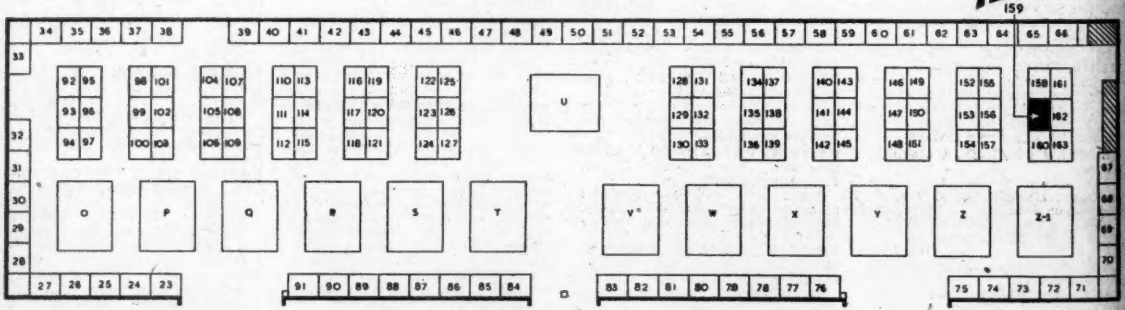
TUNGUM SALES CO., LTD., Brandon House, Painswick Road, Cheltenham, Glos. **(No. 32.)**
The "Branda" repetition bending machine for tube, bar, rod, strip and wire.

A. C. WICKMAN, LTD., Tile Hill, Coventry.
Machine tools, including single and multi-spindle automatics, precision grinding machines, grinding wheels, hand laps, "Wimet" brand tungsten carbide-tipped tools.

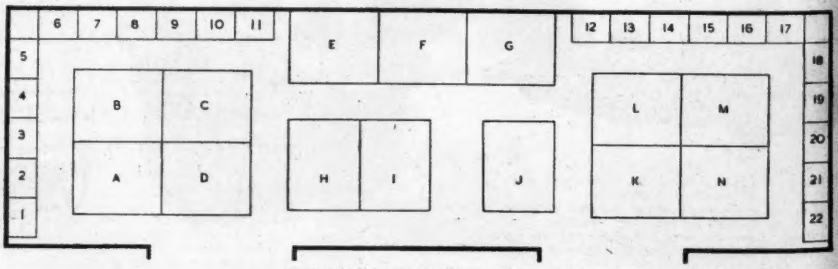
WINFIELD-SMITH, S. C., & CO., LTD., Kings Farm, Denne Park, Horsham, Sussex.
Drills, machine tools, reamers, hacksaw blades, welding rods, jigs and engineers' general supplies.

WOLF, S., & CO., LTD., Pioneer Works, Hanger Lane W.5.
Electrical tools.

WEST EXHIBITION HALL



EAST EXHIBITION HALL



FOR details of public day (week-end) arrangements and programmes, travel information, area map and a plan of Farnborough airfield, reference should be made to page 257 of the previous issue of "Flight". That issue, dated September 2nd, is complementary to this one as an industry review. It also contains notes on and illustrations of all current engines, and comprehensive data tables for British military and civil aircraft and their power plants.